June 21, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

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DETROIT

INTO THE LINE OF DUTY WITH BETTER ROLLED STEEL

Better finish - increased tonnage. Lewis Rolls and Rolling Mill Machinery combine to help speed up production.

LEWIS ROLLS

LEWIS FOUNDRY & MACHINE DIVISION OF BLAW-KNOX CO., PITTSBURGH, PA.

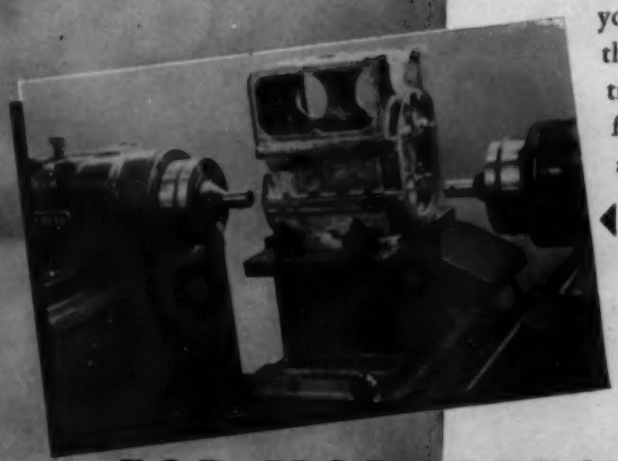
Miles Up . . .
THAT'S PRECISION

As enemy aircraft approach and the ack, ack opens up, a tiny flaw in any mechanism might mean "target missed."

By *borizing* many important gun components to extremely close tolerances—often to .0002"—Heald Bore-Matics help put precision in anti-aircraft guns that gets specks 5 miles up. And because *borizing* assures constant duplication of accuracy, part after part matches identically.

It's no secret how Heald Bore-Matics get their extreme accuracy. It's simply the same Heald know-how in precision engineering that has made Heald Boring Machines and Heald Grinding Machines the answer in leading industries demanding close tolerances, high-speed production and cost reduction.

Heald Engineers are always ready to help you with your precision boring and grinding jobs. Ask for their services. They'll help you step up production through specially designed tooling and fixtures . . . specially designed for your Heald and for your own particular requirements.



Borizing a casing for Bofors 50 mm anti-aircraft guns. First operation bores two 3.375" diameter holes spaced 4.125" apart using a cross slide of indexing. Then work is indexed 90° and two holes 1.500" are bored in line by means of opposed heads.

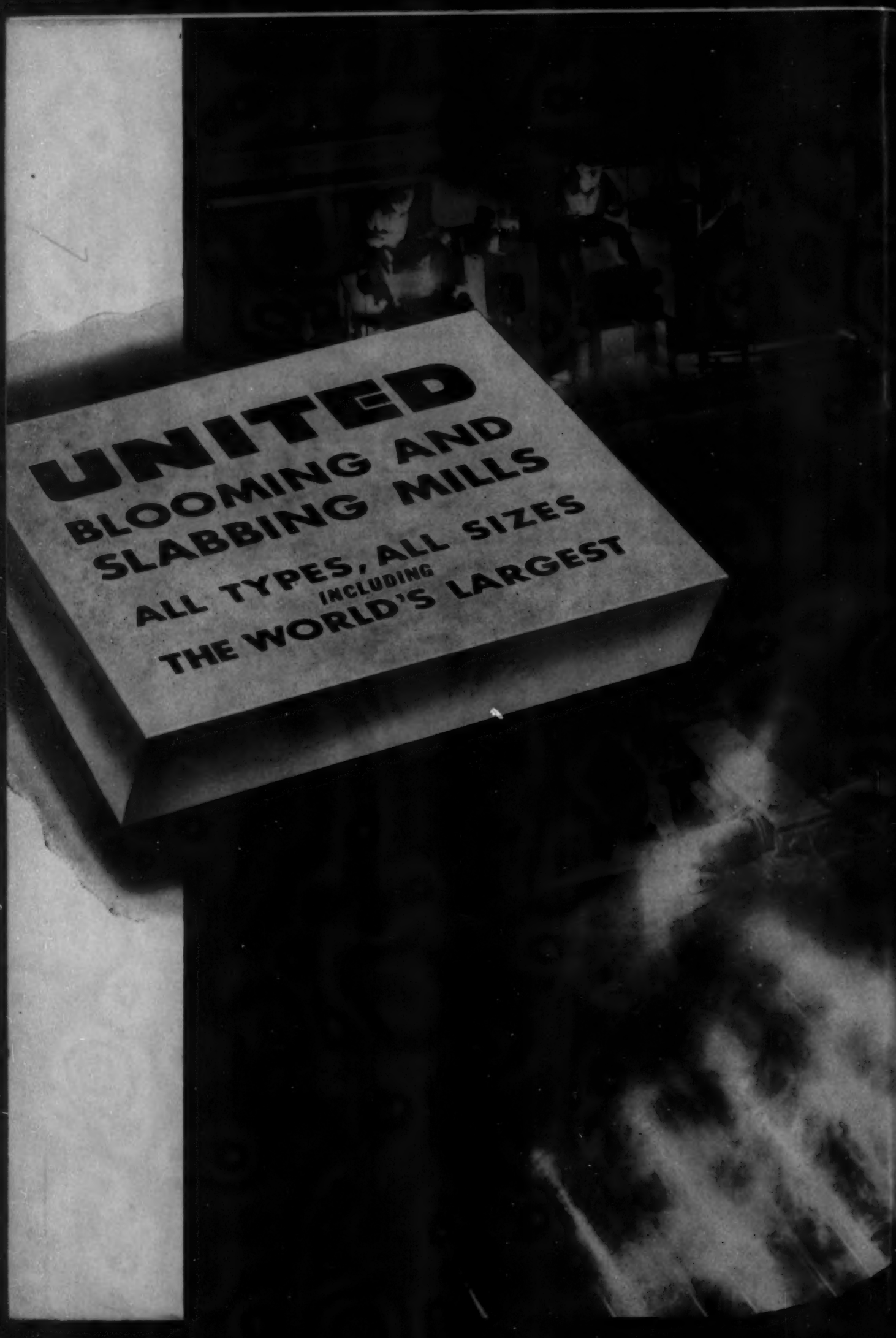
The HEALD MACHINE CO.
WORCESTER, MASS. U.S.A.

FOR MORE PRECISION *FASTER*
BRING YOUR PROBLEMS TO HEALD

BETHLEHEM WIRE ON ACTIVE SERVICE

Bethlehem Wire has gone to war. Millions of bullet cores made from Bethlehem wire are being hurled at the Axis from the muzzles of rifles and Tommy guns. . . . Hundreds of miles of underwater communication cables are being armored by corrosion-resisting bethanized wire. . . . Wire rope made from Bethlehem wire is anchoring mines, trapping submarines, rigging fighting ships. . . . Almost every kind of military equipment depends upon steel wire, as an actual working part, or at least in its manufacture. If you find Bethlehem Wire difficult or impossible to obtain we hope you will remember that a very large proportion of our output has been assigned to duty right on the fighting fronts, on land and sea.

BETHLEHEM STEEL


UNITED
BLOOMING AND
SLABBING MILLS
ALL TYPES, ALL SIZES
INCLUDING
THE WORLD'S LARGEST

UNITED ENGINEERING *and* FOUNDRY COMPANY

Pittsburgh, Pennsylvania, U·S·A

BEHIND THE SCENES

Jules Dierckx

■ Is the industrial machinery business such a "tough game"? We doubt it after hearing Guy Hubbard, STEEL's machine tool editor, tell enthusiastically of his recent reunion with Jules Dierckx in New York, twenty-two years after their first meeting as adjoining exhibitors at the now historic New Haven Machine Tool Show.

That 1921 show was merely "yesterday" in Jules Dierckx' career. Born not far from the battlefield of Waterloo in Belgium, he first came to the United States in 1888, and in 1893 he had charge of an extensive showing of ceramics at the World's Columbian Exhibition in Chicago. Switching from ceramics to metal-working machinery, Jules became an executive of the Keller company in Brooklyn and "world salesman" of the Keller mechanical process of die sinking.

Today—old in experience but young in spirit—Jules Dierckx is one of the most active figures in the machinery exporting business, vice-president of an organization specializing in sales to Latin America, authority on die forging equipment, and a senior member of the Engineers' Club of New York City.

Just in case there do happen to be any of STEEL's readers who have not had the privilege of meeting Jules at some spot on the globe during the past seventy years or more, his name is pronounced "Derricks" in the language of his beloved adopted country.

Planning Is Also Doing

■ Speaking of individuals, don't fail to read what Joseph J. Cheney, president, Spriesch Tool & Manufacturing Co. has to say in this week's issue on Postwar Planning. Mr. Cheney seems to have plenty on the ball. One of his recent statements was this: "One decision you can make today about tomorrow is to plan on using modern war production ability to insure your survival and leadership in business."

The Postwar Automobile

■ The reprint booklet containing A. H. Allen's special report on The Postwar Automobile is now ready. It will be sent in limited quantities free of charge to all subscribers. Please send your request to Readers Service Dept., Penton Building, Cleveland, 13, Ohio.

Not Unlucky, We Hope

■ Which reminds us that we should remind you that our postal district number is "13", and it should be carried on all mail headed our way to insure prompt delivery. STEEL is cooperating to the fullest extent with the Post Office and has sent to each of the 175 cities covered by the new rule complete circulation galleys on which the new postal district numbers will be placed for each subscriber. These will then he added to your addressing stencil just as quickly as possible so that your copies will reach you without any delay the first of each week.

The Post Office Department is not only willing but anxious to add these numbers to any mailing lists you may have. Simply send the list on cards or galleys direct to the Postmaster in each of the 175 cities covered by the ruling.

Armored Bibles

■ We see where the War Production Board has approved the use of several tons of waste steel plate for steel-jacketing Bibles, but at the same time has suggested that manufacturers avoid giving any impression that such Bibles will stop bullets.

Small Bibles are sold in Army post exchanges and elsewhere and usually are purchased for service men by their relatives to be carried in their breast pockets. The steel book covers might deflect or stop some flying fragments, but WPB emphasizes they afford no protection against direct rifle or machine-gun fire.

Forms for Freedom

■ Nancy Goldhaber is the Priorities Consultant for the Emsco Derrick and Equipment Co. out on the coast and her experiences have so moved her that she broke into verse in the following "Forms For Freedom":

The muscled arm of our Miss Liberty
Adjusting to the fevered pulse of War
Receives a shot of serum called Priority
And feels much sicker than she did before!

And yet the sage physicians who prescribed
The formulae of "Purp" and CMP
Allege they were entirely contrived
To centralize our vital industry!

New "forms" of treatment come in every mail
With full directions for correct "consuming"
And flocks of orders couched in logic frail
Make queries with professional presuming.

For each plant must be weighed and diagnosed
Before it gets its dose of medicines
And every secret symptom swift disclosed
To prove the need for controlled vitamins.

Steel, copper and aluminum by strict decree
If used in products of the listed kind
Are classified in category B
The rest to category A consigned.

And yet it's just because we're geared to Liberty
We've trouble with the discipline of War
And since I cannot fight to keep us free
I'll fill out forms—and swear—and fill out more!

Stand-Sit Seats

■ Note to efficiency depts: Stand-sit seats installed in the metalpolishing department of a war plant increased production 32 per cent.

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Editorial Contents—Page 49

TURNING UP PRODUCTION SCHEDULES WITH INDUSTRY'S NEW RIGHT HAND

Production-line Efficiency in a Single Piece of Equipment!

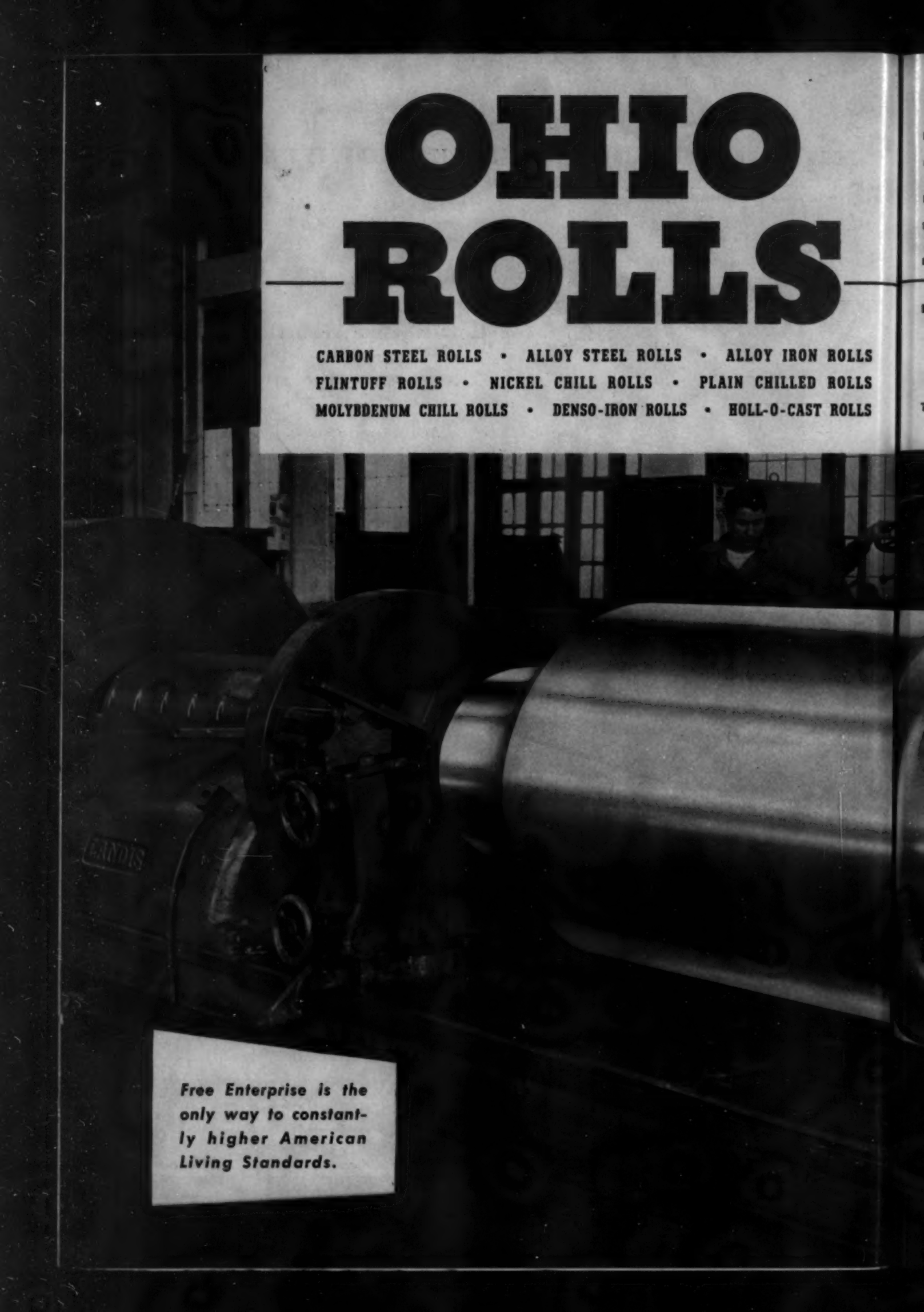
duction operations—as effectively as the revolving pistol barrel put wings on trigger fingers!

And wherever quick, accurate indexing can help production, HydrOILic equipment offers distinct advantages. HydrOILic *indexing presses* show why. Their hydraulically operated tables position the work with higher precision. Rapid, continuous operation is achieved by merely feeding and emptying the table. Safely too, because hands are never near the ram.

"Start and stop" shocks of indexing tables are overcome, because *oil* is the medium through which they are propelled. Oil (and the speed of the tables) can be regulated instantly without wear or strain, and with absolute accuracy. That's why HydrOILic equipment has proved so effective in speeding up such wartime jobs as shell loading and crimping, powder compressing . . . as well as many pressing, pushing and lifting operations.

Why not get together with Denison *HydrOILic* engineers on your problems or ideas? Write, The Denison Engineering Co., 1163 Dublin Rd., Columbus, Ohio

DENISON
EQUIPMENT in APPLIED
HydrOILics
OIL


OHIO
ROLLS
CARBON STEEL ROLLS • ALLOY STEEL ROLLS • ALLOY IRON ROLLS
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MOLYBDENUM CHILL ROLLS • DENSO-IRON ROLLS • HOLL-O-CAST ROLLS
Free Enterprise is the only way to constantly higher American Living Standards.

ACCURATE
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ENGINEERS • FOUNDERS • MACHINISTS
THE LEADER IN IMPROVED ROLL MANUFACTURING TECHNIQUE

Number 1 of a series covering use and maintenance of Southwark Testing Machines

War Service **Memo:** *To users of Southwark testing machines*

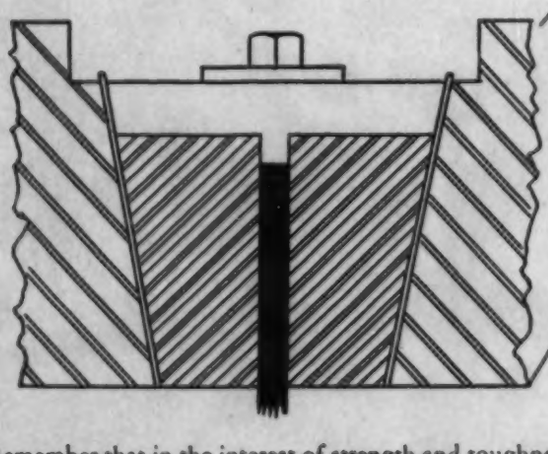
the proper use and care of

Grips

Here are a few suggestions that will enable you to extend the life of grips and eliminate one of the primary sources of trouble in physical testing.

Grips are especially designed for handling various shapes and types of specimens. Always use the proper grips for each specimen. Use "V"-grips for rounds and flat grips for flat specimens.

In selecting proper grips, the material to be tested must be considered. For example, round bars of soft steel or brass up to about ½-in. diameter can be safely tested with flat wedge grips, whereas, spring temper or hard drawn wire only ⅛-in. diameter would damage flat-face grips. For materials such as music wire, special grips with renewable file faces are recommended.



Remember that in the interest of strength and toughness, the ordinary wedge grip—either flat or "V"—cannot be made as hard as a file. Occasionally it may be necessary to make tests on materials harder than the grips. In this case an old set of grips should be used.

Before a specimen is pulled, the double pinion gears used for moving the grips in the slots should be centered and anchored in place with the set bolts. Otherwise the specimen will not be centered and may not be pulled straight.

Sufficient liners should be used, of the same thickness on both sides of each grip, so that the grips are well within the crosshead of the machine. If one or both grips pull through when the load is applied they may break or they will upset the corners of the crosshead casting and are likely to damage the double pinions.

Test specimens should extend at least ¾ of the length of the grips.

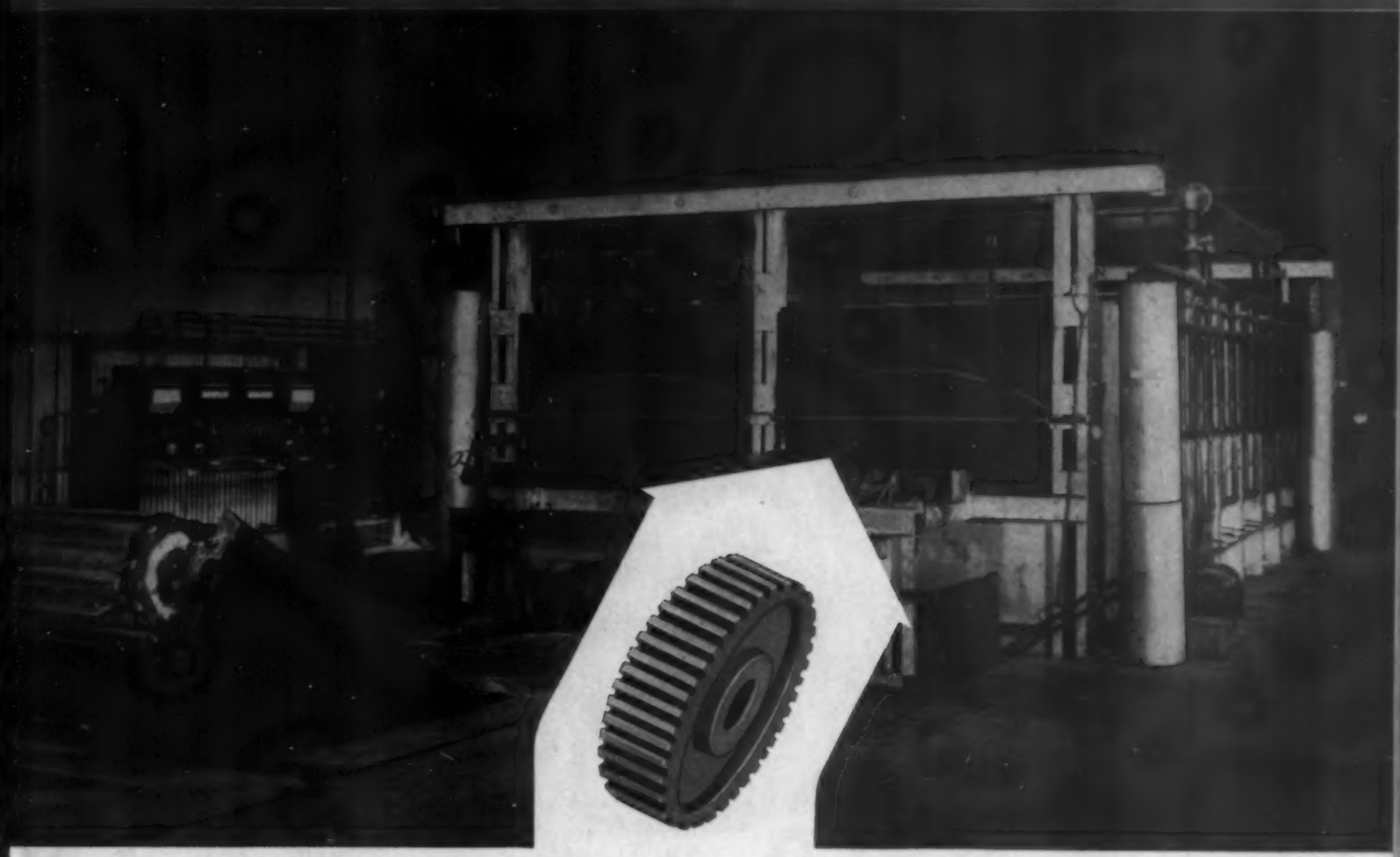
When grips do not move smoothly in the heads, as revealed by a clicking noise and a jump on the load indicator, a lubricant should be used on the back of the grips. Any grease used to lubricate lathe centers is satisfactory. White lead in oil is frequently used. Use only a small amount —and only on the backs—or it will collect scale and dirt.

Always use grips retainer furnished for bolting to crosshead castings, otherwise recoil may throw the grips out of the machine.

BLW THE BALDWIN GROUP **BALDWIN SOUTHWARK**

Division **THE BALDWIN LOCOMOTIVE WORKS,** *Philadelphia, Pa.*

INGENIOUS DESIGNING NETS SALEM CUSTOMER 2 MILLION POUNDS PER MONTH . . .



GIVES 30% EXTRA PRODUCTION

Designed and built in 1935 for peacetime production, this Salem Continuous Pusher Type Furnace is now meeting increased war production demands which are FAR in excess to the original requirements. The furnace has a double chamber—one for hardening small forgings or stampings, and another chamber for drawing, and both chambers can be used for normalizing. There is a common center wall to save heat loss. All firing is done on one side of each chamber, and due to the furnace design, excellent heat uniformity is provided. Scale is held to a minimum. One man feeds material into the hardening chamber. The parts are discharged from inside this chamber through a special chute which carries them onto a conveyor in the quench tank. The conveyor supplies another man with quenched parts which he places into the drawing chamber. This equipment, producing as much as 2 million pounds per month on various operations, nets our customer 30% higher production than he expected. And, remember, please, that during many years of this efficient production service, there have been no major repairs. Write Salem today for the answer to your heat treating problem.

SALEM ENGINEERING COMPANY

SALEM ENGINEERING CO. · SALEM, OHIO

N-A-X High Tensile

takes to the water with the amphibious jeep

. . . the low alloy steel with unusually high resistance to shock and fatigue

When jeeps are constructed they have frames made of N-A-X HIGH TENSILE. The outstanding record made by these little four-wheel drive cars of being able to stand the gaff, over rough terrain, under all types of weather conditions, is known the world over.

It was natural, then, for the manufacturers of the "Amphibious Jeep" to again use N-A-X HIGH TENSILE for frames . . . because this superior low alloy steel has the physical properties, such as resistance to fatigue and impact even at sub-zero temperatures, to withstand severe operating conditions.

N-A-X HIGH TENSILE has other important properties, too . . . high yield point, high ultimate strength, excellent welding characteristics, unusual ductility and greatly increased resistance to both corrosion and abrasion.

A Great Lakes engineer will be glad to discuss your production problems with you—to show you how other manufacturers are using this remarkable HIGH TENSILE steel to advantage. Send for new booklet on N-A-X 9100 Series—and useful Hardenability Chart.

GREAT LAKES STEEL CORPORATION

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Sales Offices in Principal Cities

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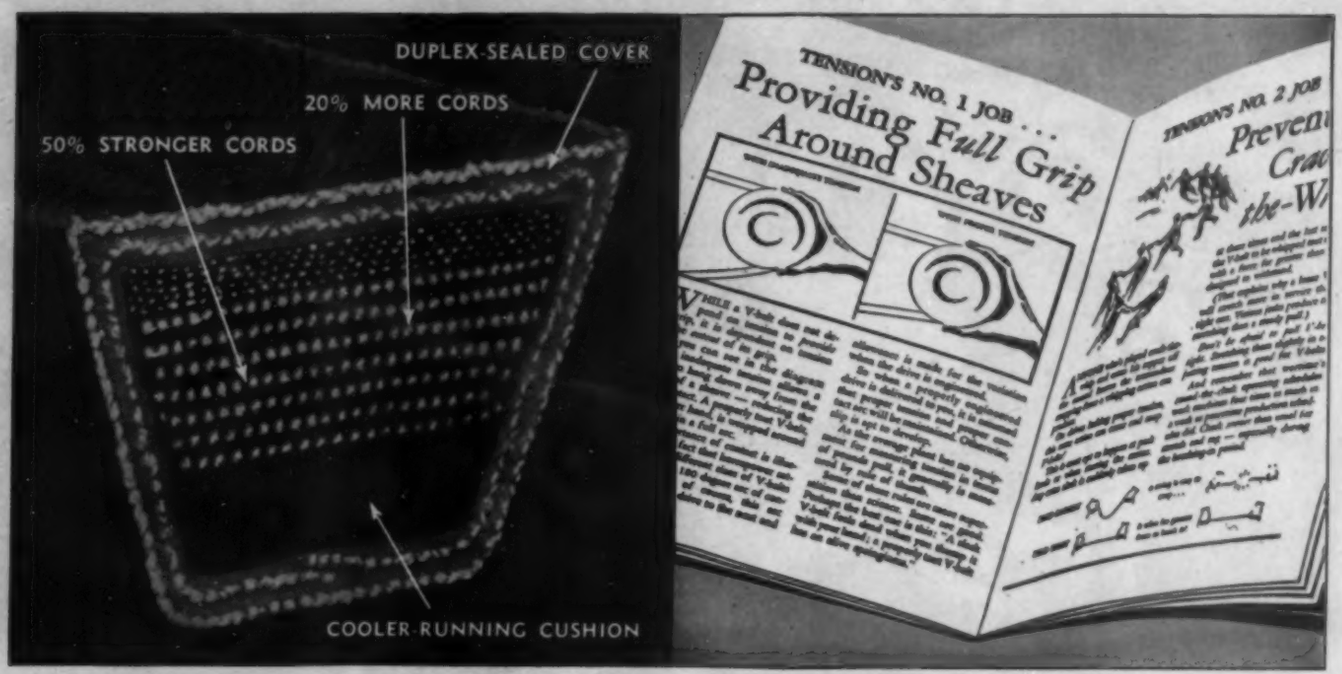
War Slogan FOR V-BELTS— "Make 'em Last!"

(HERE ARE TWO WAYS TO DO IT . . .)



1 **BUY THE BEST BELTS . .** Texrope Super-7's new design-against-wear gives maintenance a head start. The 20% more cords — made 50% *stronger* by the new Flexon process — combat stretching, give Super-7's extra pulling power. Revolutionary new shock-absorbing cushion of special cool-running rubber eases pulling cords around sheaves. Tough, new Duplex-Sealed cover protects inner belt structure against grit, grime and moisture. When you *do* need new V-belts, *invest in the best* — Texrope Super-7!

2 **USE THE BEST CARE . .** Whatever brand of V-belts you now use, you can make them last *longer* by following the tips in Allis-Chalmers' free handbook: "Plain Facts on Wartime Care of Rubber V-Belts." How V-belt anatomy affects maintenance . . . what determines V-belt "life expectancy" . . . here is the full story, packed with practical data — fully illustrated. The new handbook contains no advertising, applies to *all* makes. Tear off the coupon below and send for *your* copy of this valuable new handbook today!

ALLIS-CHALMERS

TEXROPE SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers. Available in all sizes.

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive free of charge a copy of your "Plain Facts on Wartime Care of V-Belts".

(Name) _____

(Title) _____

(Company) _____

(Street Address) _____

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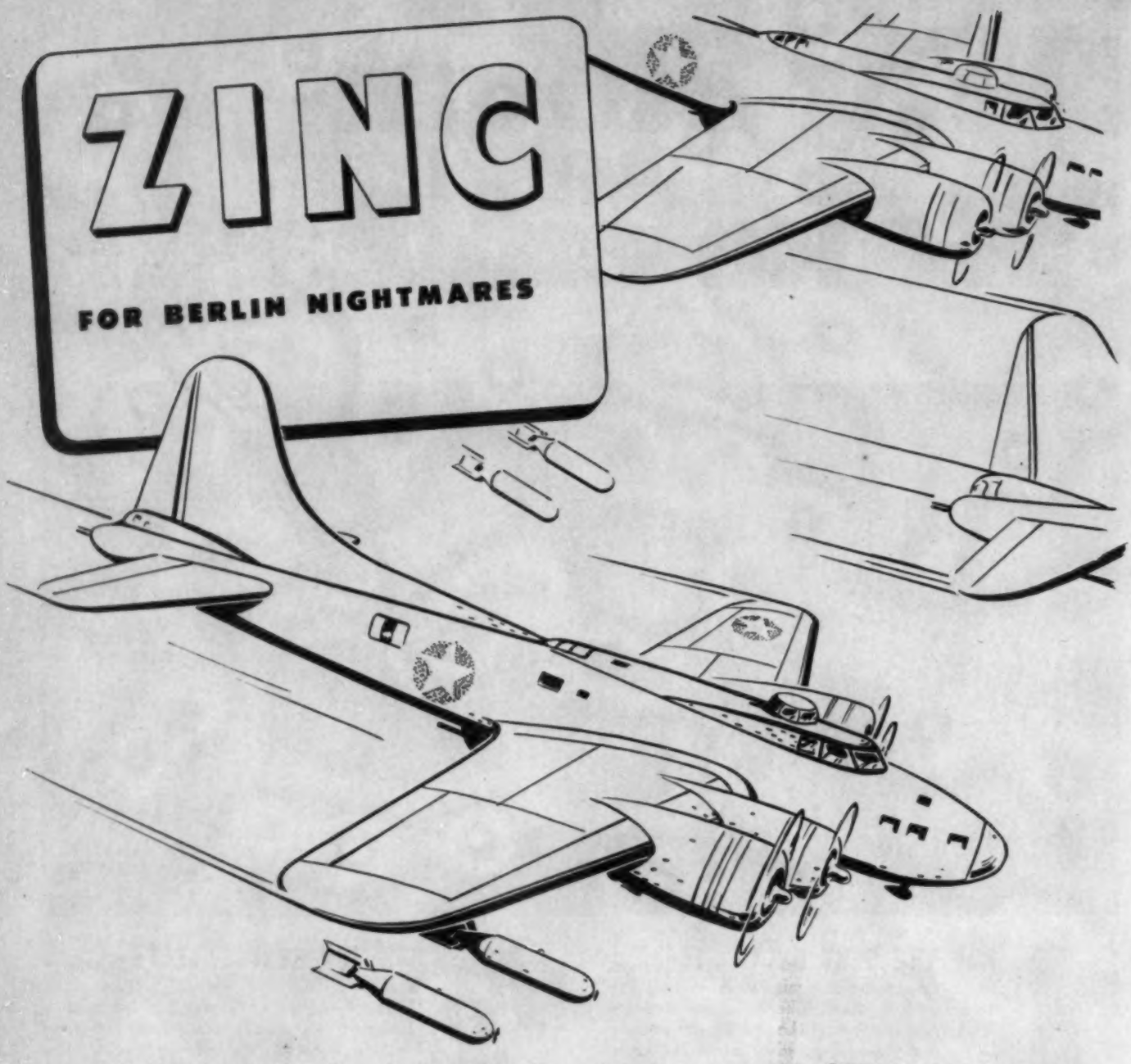
ZINC

FOR BERLIN NIGHTMARES



★ Yes, lots of it. Airplanes and their hundreds of parts are shaped and built with zinc dies. In addition, every Flying Fortress contains about 8 slabs of zinc, every fighting plane more than two slabs, and every transport plane more than nine slabs. The flare which lights the bomber's target contains a pound and a half of zinc. The radio set requires from two pounds to three hundred pounds of zinc. Every bomb contains zinc.

But just as vital as zinc is today in the manufacture of thousands of items of war, tomorrow it will serve in hundreds of new uses for the enjoyment of peace.

EVERY GRADE OF ZINC FOR WARTIME REQUIREMENTS

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SELECT
★
BRASS SPECIAL
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AMERICAN ZINC, LEAD & SMELTING CO.
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A Letter from Guadalcanal...

In a recent letter from a lad at Guadalcanal to his former employer was voiced the greatest challenge of our time.

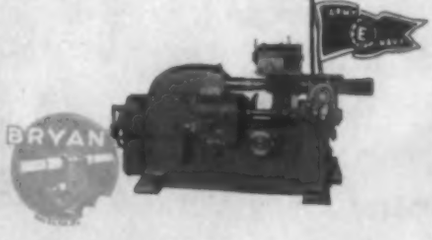
"What," he said, "am I, and all these fellows with me, going to do when this thing is over?" Is peace to bring with it the deadly spiral: men laid off and demobilized, hence less purchasing power, hence more plants closed down, hence more men laid off, hence — ?

We believe we've seen the answer right on the production lines and right in the post-war plans of American industry.

We've seen and consulted with hundreds of research men uncovering new secrets in metallurgy, synthetics, plastics, aeronautics — finding new techniques and economies — planning new and wonderful products that will cushion the post-war interim to the greatest production age in history.

As internal grinding specialists, we at Bryant have already helped to solve production problems involving the machining of many new light metals, alloys, and synthetic materials including glass, plastics, hard rubber, wood, graphite, and even machine parts made of paper.

We've developed many new techniques in tooling, and we believe that this knowledge is important to your future. For that reason, our Consulting Service is available at all times. Call upon us now!



Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

SEND FOR THE MAN FROM BRYANT . . .

Old friend arrives . . . Thanks to you

When you're halfway around the world, trying to finish an important job, it's mighty pleasant to greet an old and very helpful friend you used to work with.

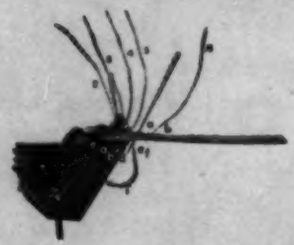
Back home, in scores of industries, the men now on palm-fringed shores learned an affectionate respect for the dependability of Wickwire Rope. Now when stout wire rope is more than ever a matter of life and death, the sight of a reel of *Wickwire* Rope brings double cheers.

These buddies of ours know that *you* need Wickwire Rope, too—to help in your speeded-up *production* of lots of things for them. So they're grateful when you make each length you now have last longer, so that more Wickwire Rope can be used to equip the Liberty Ships, and to send overseas.

But when you do need more of this friendly Wickwire Rope to help maintain your war-production pace, won't you please order it *without* reels, if lengths will permit, so that handier reels can be spared for the boys out there? Wickwire Spencer Steel Company, 500 Fifth Avenue, New York.

. . .

Wickwire Spencer was the first manufacturer in all New England to be awarded the Maritime M and Victory Fleet Flag for outstanding production accomplishments!



DO YOUR MEN KNOW HOW?

Our free book "Know Your Ropes" pictures the best ways to aplice, attach sockets, etc. Also shows the right and wrong ways to use wire rope. In the hands of new men (and even old-timers) it can help you make your present wire rope last longer. Send for a free copy.

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

WICKWIRE ROPE

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WISSCO PRODUCTS

and I learned to run his Oster in a jiffy!"

Men leaving machines for military service. Experienced operators frozen to jobs. Only solution is rapid training of new operators. It's a serious problem with complicated machines. Not so with the Oster No. 601 "RAPIDUCTION" —the *SIMPLIFIED* Lathe now equipped with automatic indexing of its 6-station turret.

Capable of handling a wide variety of bar and chucking operations, including unusually heavy forming cuts, Oster "RAPIDUCTION" Turret Lathes have SIMPLIFIED the problem of training new operators rapidly to necessary standards of efficiency.

Does this seem to offer YOU at least ONE solution to YOUR problems of man-power shortage? If so, use the form below NOW!

No Time Out to Celebrate Our 50th ANNIVERSARY 1893-1943

OSTER

THE OSTER MFG. CO., 2037 E. 61st ST., CLEVELAND, OHIO, U. S. A.

We are seriously interested in the Oster No. 601 "RAPIDUCTION" Turret Lathe. Please send Catalog No. 601 at once.

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ABLE TO TAKE IT--

IN THE TOOL ROOM OR ON THE PRODUCTION LINE

Built to "dish it out" and take it, too, Uncle Sam's tanks demand tough materials and skilled design to give them stamina and striking power.

The same principles hold for milling machines —the machine tools that are mighty important in building tanks and other weapons. In tool room or on the production line, milling machines must be built to perform at a record-breaking pace and maintain close tolerance-accuracy in operation.

The center bearing on the spindle of Milwaukee Milling Machines reduces by one-half the distance between bearings—*increases rigidity eight times!*

Ask the man at the controls of a Milwaukee—he can tell you how important this center bearing is (in addition to the husky column) in providing built-in rigidity and all that it means in sustained accuracy — longer cutter life —smoother performance at all speeds and feeds.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN

Buy Victory with at least 10% in War Bonds!

Milwaukee MACHINE TOOLS

"Breaks" LIKE THIS

ARE NO "BREAK" FOR PRODUCTION

Broken tools—mechanical troubles — caused by improper care and operation of machine tools, are no help in production for Victory. Practically every machine tool manufacturer offers valuable advisory service — "care and operation" handbooks — technical bulletins — on better methods of operation that help green men as well as speed and improve production of skilled workers.

Put full information in the hands of the men who operate your machine tools — teach them the "know how" to get the most in production with the least waste of time, effort and materials.

Buy Victory with at least 10% in War Bonds!

RIGHT "ON THE Beam" FOR TRAINING MILLING MACHINE OPERATORS . . .

"MILLING PRACTICE" *Visual Training Course*

This Visual Training Program, consisting of five sound-slide films dealing with the fundamentals of milling practice, continues to prove highly popular with technical instructors and industrialists everywhere. Interestingly arranged, the films show many types of operations such as T-slotting, angular and straddle milling, circular milling, dovetailing, boring and end milling.

Many shop training directors report unusually successful results with this visual course. It is available on a rental basis at nominal cost. We invite you to write for full information to our Department of Industrial Education.

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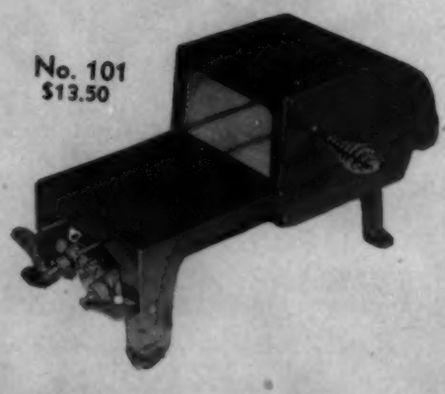
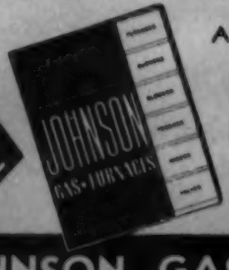
No. 575 — Pot Hardening and Melting Furnace
No. 2014 — Oil Tempering Furnace
No. 570 — Pot Hardening and Melting Furnace
No. 101 — Bench Furnace

ALL PRICES F.O.B. FACTORY





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JOHNSON GAS APPLIANCE CO. CEDAR RAPIDS, IOWA

HANG ONE OF THESE CARDS IN YOUR SHOP

Tools for Machining Aluminum

FOR GENERAL MACHINE SHOP PRACTICE

TOOLS for machining aluminum should generally have more top and side rake than is common for machining steel; the cutting edges should be keen and the tool surfaces should have a smooth, bright finish.

In the following illustrations, a wide range of rake angles is indicated. In general, the larger rake angles are employed for finishing tools and for the aluminum alloys that are not free-cutting; this includes the softer materials which require tools with exceptionally acute and keen cutting edges. On the other hand, rake angles in the lower range are used for roughing cuts and for machining the alloys that have free-cutting characteristics. Tools similar to those used for machining steel may often be employed successfully.

TOOL MATERIALS—High-carbon steels are good for many jobs where the cutting speed is low. High-speed steel steels are better for quantity production. Cemented-carbide-tipped tools are superior to high-speed tool steels, especially for aluminum alloys with a high silicon content.

CUTTING SPEEDS AND FEEDS—Generally, aluminum can be machined to best advantage by using the highest speed at which the equipment is capable of operating, with moderate feeds and cuts.

CUTTING COMPOUNDS—Use a suitable amount of cutting compound. Soda water or soluble oil may be used for milling, drilling, and sawing operations. Mineral oil with the addition of 5 to 10 per cent fatty oil, such as lard oil, is an excellent lubricant. A 50-50 mixture of kerosene and lard oil gives excellent results.

The information printed on this large card (14″ x 20″) will answer many questions for machine operators, to whom the machining of aluminum is new. Use this coupon to send for a copy or write us on your company letterhead—

ALUMINUM COMPANY OF AMERICA
2112 Gulf Building, Pittsburgh, Pa.

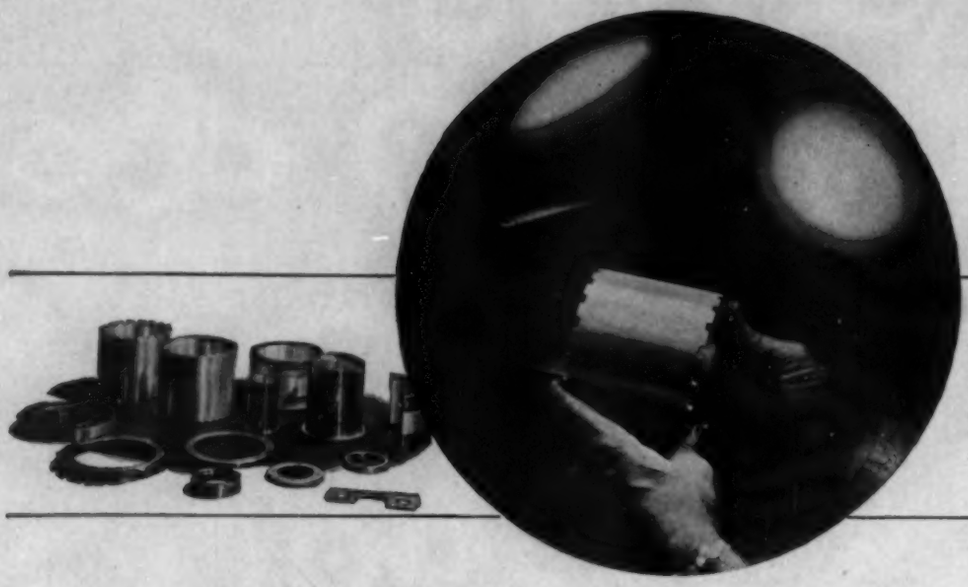
Please send me your wall card on "Tools for Machining Aluminum."

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

TOWN _____ STATE _____



"Black Light" testing makes certain the bond is perfect on edges of all Mallory Bearings. Under its magic rays, microscopic voids and cracks show up by fluorescence. A filter cuts out visible radiation from the "Black Light", allowing only ultra-violet radiation to pass.

MALLORY Bearings

Meet Critical Loads Superbly

WHERE ordinary bearing surfaces are inadequate to meet the stresses and strains a fighter plane's engine must undergo, Mallory Bearings function marvelously. They can take the terrific pounding and fatigue stresses imposed by suddenly applied loads from a high powered pursuit plane in action.

Mallory Bearings are made by Mallory's Mallosil Process of bonding silver to base metal backings. They provide a tough, homogeneous, heat dissipating silver surface of high fatigue resistance; ample strength and hardness; and high resistance to seizure.

What is more, Mallory Bearings are precision made. Through use of newly designed precision tools and test instruments, skilled Mallory craftsmen have set remarkable records for exactness and uniformity in producing bearings, bushings, pinion races, gear races and other aircraft engine parts. With tolerances measured in split-thousandths, they are turning out ever-increasing quantities of precision parts with an accuracy and uniformity considered impossible only a few short months ago.

Continuous experimental designing and testing indicate even greater results for the future. The experience and technique gained in War production will be invaluable for commercial motors development when Peace has arrived. Consult us on the possibilities of the Mallosil Process for you.

P. R. MALLORY & CO., Inc., INDIANAPOLIS, INDIANA • *Cable Address* — **PELMALLO**

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P. R. MALLORY & CO. Inc.
MALLORY

SERVES THE AVIATION, THE AVIATION-INSTRUMENT AND THE AVIATION-COMMUNICATION FIELD WITH WELDING TIPS, THE MALLOSIL PROCESS—BEARINGS, SPECIAL ALLOYS, ELECTRICAL CONTACTS, VIBRATORS, VIBRAPACKS, CONDENSERS, ROTARY AND PUSH BUTTON SWITCHES, ELECTRONIC EQUIPMENT, COMMUNICATIONS HARDWARE, RECTOSTARTERS

TO YOU it looks like a tank, but to us it is reminiscent of a dredge pump casing . . . or a locomotive frame . . . or a bank vault . . . or an annealing box . . . or any other tough and enduring industrial casting made by Union Steel.

★ ★ ★

The tank is reminiscent of these things, because these are the things we used to make before Uncle Sam became our Class "A" customer, and Army and Navy ordnance armor our major product.

★ ★ ★

But, while our production effort here at Union is mainly concentrated on the war, we are thinking hard about what is coming after. It may be that our post-war planning could be of help to you—in making castings that fit Tomorrow's bewildering needs.

ARMY E NAVY

UNION STEEL CASTINGS

DIVISION OF BLAW-KNOX COMPANY • PITTSBURGH, PENNSYLVANIA

MAKERS OF:

Driving wheel centers, locomotive frames, pump casings, vault doors and frames, annealing boxes, spindles, coupling boxes, open hearth charging boxes, gear blanks—and other steel and alloy castings for steel mills and general industry.

Still in the Lead....

AND GOING STRONG!

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RUBBER COVERED SUPER-FLEXIBLE WELDING CABLE

• A new principle in construction made "MAJOR" the leader in welding cable nearly ten years ago; today it is the fastest selling cable in shipyards, arms plants and all wartime industries. In spite of these unprecedented demands we can, for a limited time, still make quick shipments—investigate!

FREE CLIP AND MAIL COUPON FOR YOUR FREE COPY OF "WELDING CABLE GUIDE"

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264 E. OGDEN AVENUE
MILWAUKEE WISCONSIN

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CONCERN:

ADDRESS:

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SPECIFICATIONS

Size	Amps.	Strands	O.D.	I.D.	Wt. in lbs. per M ft.
6	75	950	.400	.210	132
4	125	1029	.495	.275	202
3	150	1323	.500	.305	235
2	200	1666	.560	.335	295
1	250	2156	.625	.400	373
1/0	300	2646	.675	.440	450
2/0	375	3381	.750	.490	570
3/0	450	4284	.815	.545	705
4/0	550	5376	.900	.635	860

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MILWAUKEE, WISCONSIN
MANUFACTURERS—DISTRIBUTORS
OFFICES AND AGENTS ALL OVER THE UNITED STATES

IF IT'S PIPING CONTACT FLORI

The construction of a U. S. Army tank requires huge quantities of fabricated pipe and plate steel products . . . All this is within our scope:

Fabricated Piping—for steam, water, air, oil, gas, chemicals • Random mill or cut lengths, bent, coiled, threaded, welded, flanged • Valves, Pipe Fittings

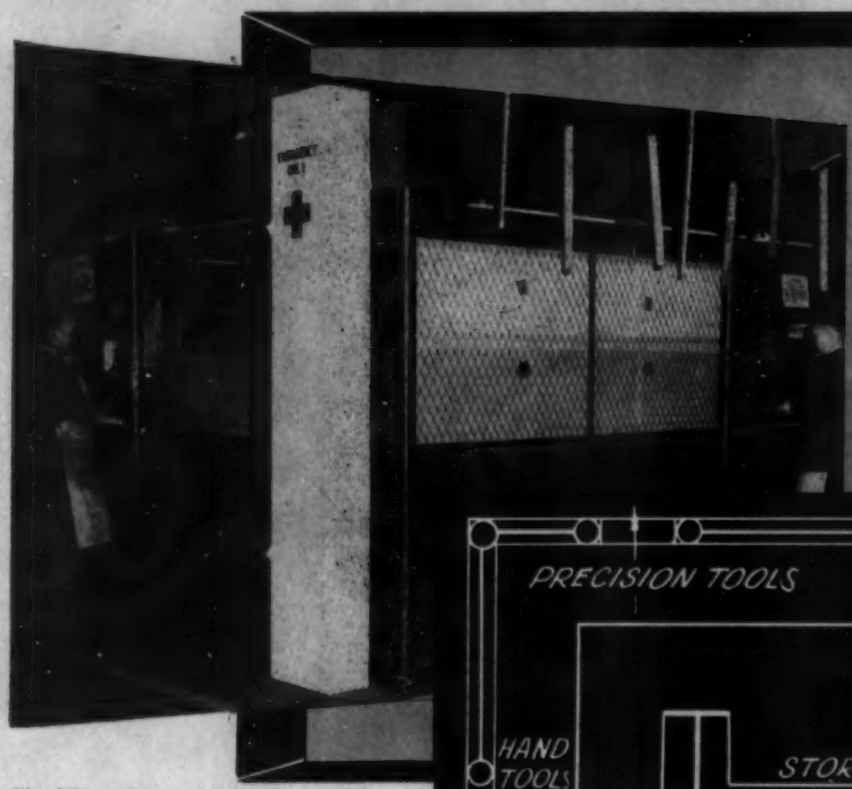
In brief: anything in tubular or plate steel fabrication. Send your inquiries.

FLORI PIPING

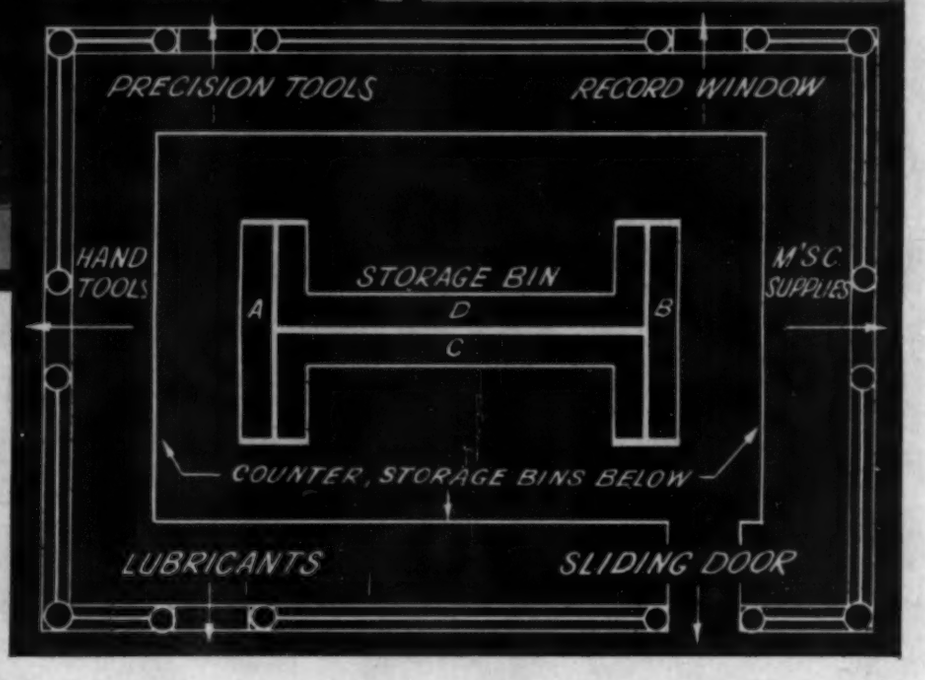
OFFICIAL U. S. ARMY PHOTOGRAPH

THE FLORI PIPE COMPANY • ST. LOUIS—CHICAGO

More Windows IN YOUR TOOL CRIB



This photograph shows 2 of the 5 windows in the Tool Crib of the Jig Shop at Republic Aviation Corp., Farmingdale, N. Y., plan of which is shown below.



Floor Plan. Storage bins for articles served at each window are under delivery counter. Note "record window," used for starting employees, assigning checks, releases, transfers.

Suggested Plan for Reserve Storage Bin

"A" *Hand Tools:* Drills, rivet sets, counterbores, mallets, files, etc.

"B" *Supplies:* Emery and sand paper, tapes, gloves, towels, etc.

"C" *Containers:* For carbon tet., kerosene, mineral spirits.

"D" *Precision tools:* Height gages, levels, transits, calipers, micrometers, angle plates, etc.

LESS *Waiting Time* FOR YOUR MEN

HERE'S a tool crib with five windows — one for every class of tools and supplies. It's big, but the management finds that it pays big returns — by reducing waiting time for men and "down" time for machines.

Your layout may not need to be so elaborate; but careful planning of your tool crib to assure free movement and systematic order always results in longer life and more effective use of your tools.

GTD GREENFIELD

TAPS · · · DIES · · · GAGES · · · TWIST DRILLS · · · SCREW PLATES

ARMY E NAVY

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS

DETROIT PLANT: 5850 Second Blvd.

WAREHOUSES in New York, Chicago, and Los Angeles

In Canada: GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

Tool Conservation Begins in the Tool Crib

A 100% RECORD

Awards on May 8th, 1943 to two plants in Kenosha, Wisc., completed this 100% record for The American Brass Company.

ALL TEN AMERICAN BRASS CO. PLANTS IN U. S. A. HAVE EARNED RIGHT TO FLY ARMY-NAVY "E" FLAGS

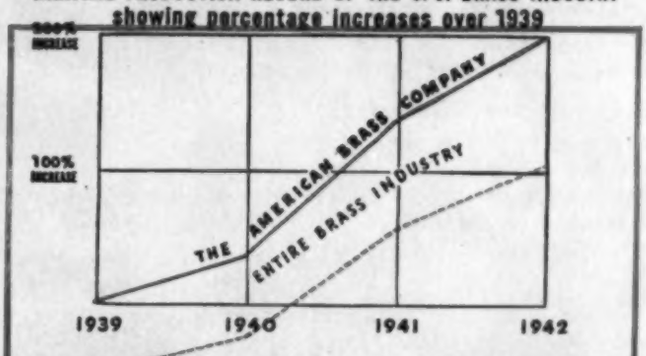
This is the story in terms of war production

Our Connecticut plants were among the first in the brass industry to receive the coveted "E" Award for outstanding production of war materials. Since then *all* our plants, including those in the States of Michigan, Wisconsin and New York, have been similarly honored.

As the largest fabricator in the copper and brass field, The American Brass Company is keenly aware of its responsibility and its opportunity to serve the cause of the United Nations.

Since 1939, production has been tripled, with virtually every pound today going for war purposes.

WARTIME PRODUCTION RECORD OF THE U. S. BRASS INDUSTRY
showing percentage increases over 1939



This chart*, based on 1939 peacetime production, shows the rapid swing into all-out war production, both by the copper and brass fabricating industry and The American Brass Company (not including Government-owned plants). All-time production records have been continually broken ever since the National Defense Program was initiated in 1940.

*Based on compilations of The American Bureau of Metal Statistics

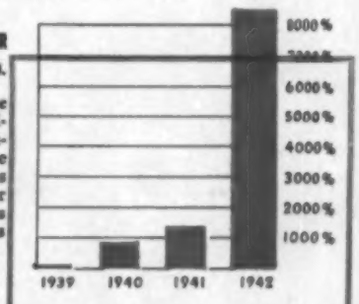
This record was accomplished by close cooperation between management and labor . . . careful planning for rapid conversion to wartime operations . . . imensive training of new personnel . . . plus efficient utilization of existing and new plant equipment.

Detailed figures, of course, cannot be revealed, but The American Brass Company is consistently breaking all previous volume records. In addition to its U. S. plants and that of a Canadian subsidiary, Anaconda American Brass Ltd., the company's production also embraces three plants operated for the United States and Canadian Governments.

Shipments this past January were the largest in the company's history. March exceeded January. The first quarter of '43 was by far the greatest tonnage quarter in the records of the company.

PRODUCTION OF COPPER ALLOYS FOR AMMUNITION by The American Brass Co.

This chart shows the vast increase in production of copper-base alloys directly earmarked for ammunition in plants operated by The American Brass Company. This is one of the most vital needs for copper and brass. Tremendous quantities are required for all types of ammunition.



The American Brass Company is proud indeed that all the plants it operates in the U. S. A. have won the honor of flying the Army-Navy "E" for excellence in production. But it is even prouder of the organization and the will-to-produce that have made this record possible . . . *and will keep it going.*

481840

THE AMERICAN BRASS COMPANY

ANACONDA

Subsidiary of *Anaconda Copper Mining Company*

BUY ALL THE BONDS YOU CAN AFFORD . . . TURN IN ALL THE SCRAP YOU CAN FIND

If you ever need a sub-contractor to stamp, fabricate and finish metal parts

McKINNEY MANUFACTURING COMPANY—large and reliable 78 year old builders' hardware manufacturer has extensive capacity available for stamping, fabricating and finishing 3 to 20 gage metal.

Facilities for sub-contract work include—

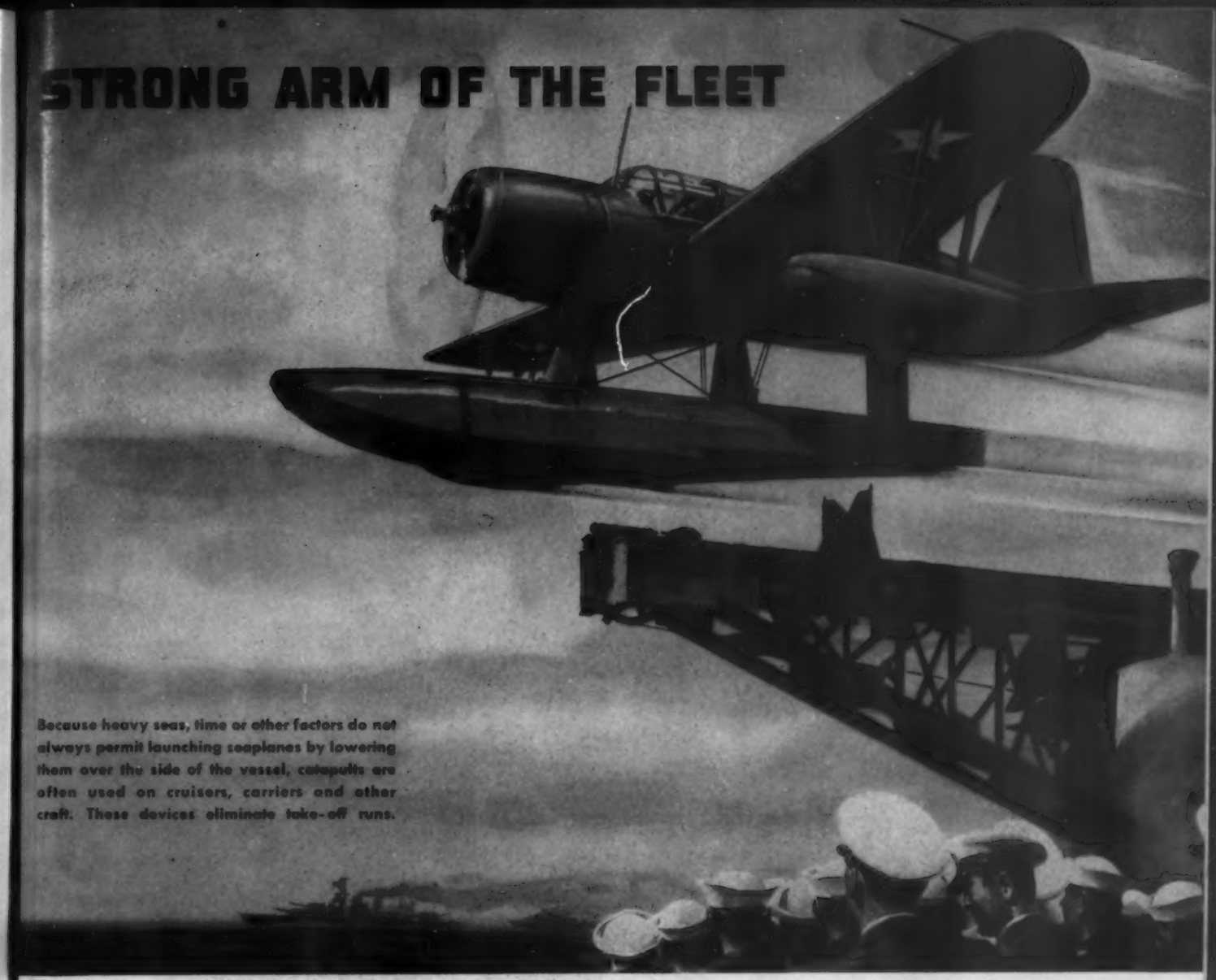
500 machines from 10 to 150 ton capacity
with 2-inch to 6-inch stroke for
blanking and forming,
drilling and countersinking,
wire heading,
milling.

Also large capacity for barrel and tank electro-plating, Bonderizing, Japanning, Sherardizing, paint and lacquer finishing.

McKinney *will not* hold up your production line.

Write, wire or phone McKinney Manufacturing Company, War Contract Division, No. 2, 1400 Metropolitan Street, Pittsburgh, Pa.

STRONG ARM OF THE FLEET



Because heavy seas, time or other factors do not always permit launching seaplanes by lowering them over the side of the vessel, catapults are often used on cruisers, carriers and other craft. These devices eliminate take-off runs.

TO THROW an airplane into the air takes a mighty strong arm. Launching these eyes of the fleet from a cruiser deck is the job of the catapult.

Gears on the catapult must be rugged to stand the punishing shock that comes when the speed of the airplane weighing more than two tons is increased from 0 to 70 miles per hour in a distance of 60 feet!

The gears in the engines powering these planes must be tough, too. For though light in weight, their job is to transmit the power of 2000 horses to whirling propeller blades.

Making these gears—the rugged ones for the launching devices and the marvels of high precision for the airplane engines—is Foote Bros.' job, and Foote Bros. are proud of the service that the gears they make are rendering—proud of the manufacturing know-hows, the advancements in techniques that have been developed to produce these gears in the tremendous quantities needed for an America at war.

But more important to American Industry is what these manufacturing know-hows will mean to peacetime production. For experience gained today in producing gears that are tougher—gears that possess a higher degree of precision—gears that demand the latest manufacturing technique will assure more economical power transmission—more efficient machines for American Industry when the war is won.

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard • Chicago, Illinois

FOOTE BROS.

Better Power Transmission Through Better Gears

MATTISON GRINDERS IN PRODUCTION

on Breech Rings and Breech Blocks

The illustration above shows a Mattison High-Powered Precision Surface Grinder in production on breech rings for a Canadian war production plant. These rings are ground 5 sides and must be held to close limits and square with the bore.

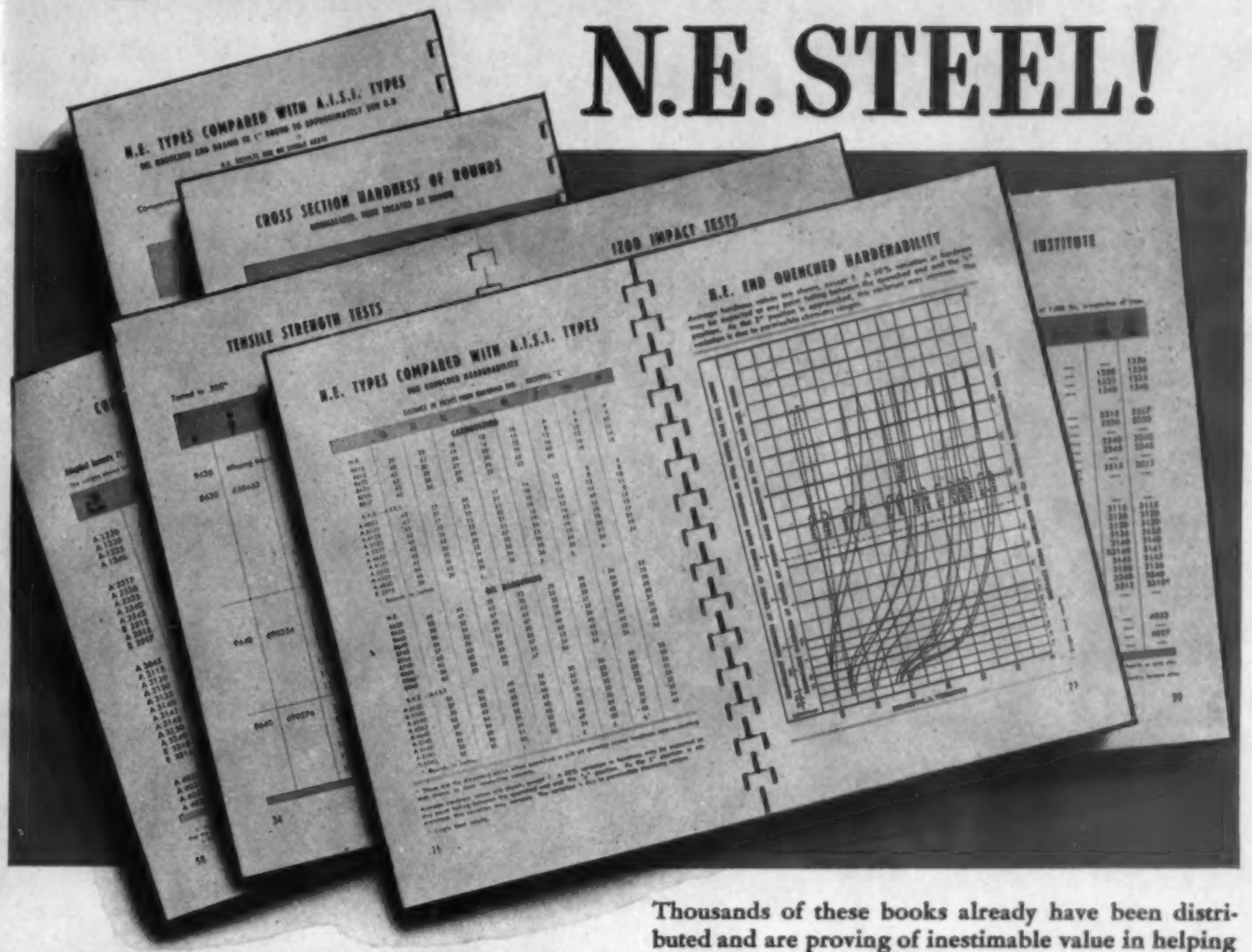
Breech blocks in illustration to the right are ground four sides. Approximately .015″ is ground off and a tolerance of .002″ is allowed, but they are actually ground to size much closer than that.

Mattison Surface Grinders are constructed to an unusually high degree of accuracy and sturdiness which permit the profitable production of precision work at a high output rate. For further information, regarding the grinding of war jobs, ask us to send you free set-up sheets with complete information.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

How to select the correct N.E. STEEL!



● Republic's N. E. Steel Handbook will tell you how! It will bring you valuable facts and information prepared by the same men who helped develop the National Emergency Steels — Republic metallurgists.

This timely book offers an unusually complete description of the N.E. Steels, their chemical analyses, physical properties, their relationship to standard steels and why they substitute satisfactorily for high alloy steels.

It presents the very information you need on how to select the correct N.E. grade for each application, how to fabricate it and the precautions to exercise. It explains the end quench hardenability test and why it is used in predicting certain physical properties. It contains many useful tables, including combined standard lists of A.I.S.I. and S.A.E. steels.

Thousands of these books already have been distributed and are proving of inestimable value in helping steel users speed up and increase war production. If you are an engineer, metallurgist or production executive using N.E. steels, or if you contemplate changing to them, you should have a copy. Fill in and send the coupon below, and your book will be mailed promptly.

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You Name the Part—

Probably we make it

Brake Shoe **MAKES PARTS** for original equipment and for maintenance; parts that are upset and drop forged; molded fabrics and plastics; ferrous and non-ferrous castings. In war, as in peace, Brake Shoe ships millions of parts to thousands of manufacturers, in many fields of industry.

The services of our research and development engineers are available for immediate or post-war problems.

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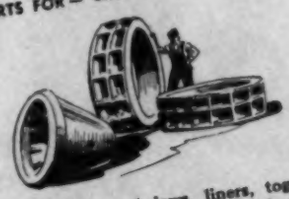
Brake lining, clutch facing, fan belts, radiator hose, axles, shafts, gear blanks and engine part forgings.

PARTS FOR — CRUSHERS



Manganese steel jaws, liners, toggle seats, mantles, conveyors and roll shells. Bearings and babbitt metals.

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Meehanite precision castings for machine tool bases, beds and columns. Sprockets. Bronze bushings.

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Brake shoes, lockeys. Chilled tread car wheels. Car and locomotive wearing parts. Axle or journal bearings.

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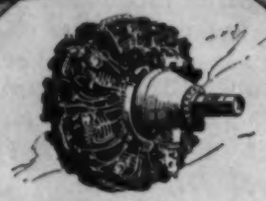
Ash handling pumps. Manganese steel pulverizer and grab bucket parts. Alloy steel superheater parts.



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Forgings for cylinder barrels, crank shafts and connecting rods. Bearings for starter and camshafts, fuel pumps.

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Welding products for reclamation, hard surfacing and repair of ferrous equipment parts. Welding rods, flux.

PARTS FOR — HEAT TREATING

Chromium nickel alloy boxes, pots, pans, trays, hearth plates, chain, rails, muffles and retorts.

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American Forge Division	Chicago, Ill.
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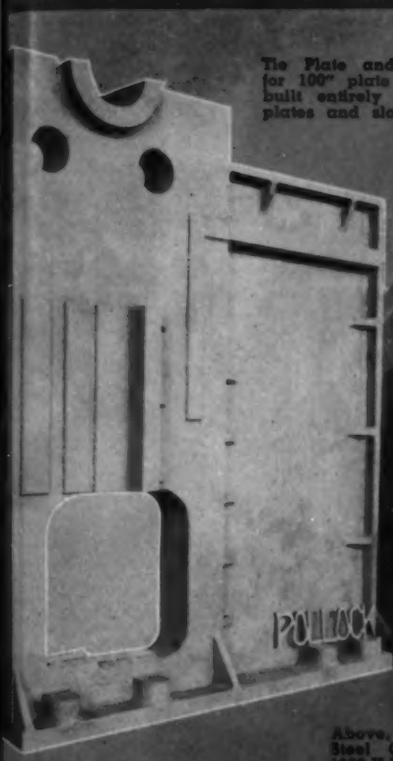
National Bearing Metals Corp.	St. Louis, Mo.

AMERICAN **Brake Shoe** COMPANY

STEEL PLATE CONSTRUCTION FOR BLAST FURNACES — STEEL PLANTS AND ALLIED INDUSTRIES . . . .



Tie Plate and Housing for 100" plate shear . . . built entirely of heavy plates and slabs.

Top of Blast Furnace, shop assembled, matched-marked, knocked-down, and shipped for assembly in India.

Above. This large Welded Steel Gear Blank is for a 1500-H.P. rolling mill drive. It is 134" diameter, 38" face, and weighs 81,500 pounds.

Right. Tunnel shield, 25 feet in diameter, built for Chicago Subway.

Left. Penstock fabricated and erected for Georgia Power Company.

Right. Welded Galvanizing Kettle 42 inches wide, 48 inches deep and 28 feet long.

POLLOCK

A MESSAGE TO OPERATORS OF WAR PLANTS.

Let THE WILLIAM B. POLLOCK COMPANY take care of the maintenance and repair work in your plant at this time, when your efforts must be 100% on production. THE WILLIAM B. POLLOCK COMPANY is an old established Steel Plate Working concern, with a modern plant, manned by skilled plate shop and machine shop mechanics, and with a large experienced Engineering Department. We are equipped to Engineer, Fabricate and Erect, and we solicit your inquiries.

The WILLIAM B. POLLOCK COMPANY

YOUNGSTOWN, OHIO

STEEL PLATE CONSTRUCTION • ENGINEERS - FABRICATORS - ERECTORS

It's no good if he doesn't know how to use it!

• It's an odds-on bet . . . sometime soon one of your men will face a fire, armed with one of your extinguishers.

Will he know what to do? Will this man in your plant know what kinds of fire this extinguisher should be used against? Does he know how to make it work?

There is one sure way to control blazes in your plant—fast and sure-handedly. Teach key men how to handle fire . . . how to handle fire-fighters. *Stage demonstrations. Show these men how extinguishers behave under fire.* We can help you do it.

A new Kidde handbook—"How to Teach Fire-Fighting"—tells how to stage a fast-moving, interesting, instructive demonstration of extinguishing methods. Send for your copy. Walter Kidde & Company, Inc., 647 Main St., Belleville, N. J.

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PROTECTS LIVES

HIGH PRESSURE GASES • FIRE PROTECTION

TRANSPORTATION
IS THE LIFE-LINE OF THE STEEL MILL

PLYMOUTH POWER IS RELIABLE

WITH the steel industry going at full blast, movement of materials is clock-work precision with each operation.

That's why the Superintendent of Transportation in one of the nation's largest steel plants isn't worrying about switching and spotting cars . . . shifting moulds . . . getting the ingots and scrap hauled . . . switching out the loads . . . because Plymouths are doing EVERY job efficiently.

Plymouth Flexomotives are built for steel mill service. Their availability, dependability, low maintenance and operating costs make them a highly desirable unit for steel plant operation.

Buy More War Bonds

PLYMOUTH LOCOMOTIVE WORKS

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PLYMOUTH *Flexomotive*

DOLLAR FOR DOLLAR——————THE GREATEST LOCOMOTIVE EVER BUILT

B&W "KNOW-HOW" SMASHES A BOTTLENECK

A manufacturer of aircraft parts with a new need for seamless steel tubing came to The Babcock & Wilcox Tube Company with rigid specifications for a cold drawn tubing that B&W couldn't furnish for months.

B&W engineers investigated — asked about rough and finish cuts, heat treatment, distortion and matters the manufacturer hadn't thought worth considering. They recommended a size of hot finished tubing instead of the cold drawn, showed how it could be machined to produce the desired result.

Accepting B&W suggestions, the buyer found that even with the necessarily increased machining costs, the overall cost was less. And the hot finished tubes could be delivered immediately!

Time and again B&W engineers have combined imagination with a keen understanding of production methods to recommend changes in tubing or changes to tubing that speeded deliveries, accelerated production or saved steel.

B&W may or may not be able to meet all your *specifications*, but given all the facts about your *use* of tubing, B&W engineers can help solve your tube procurement problems.

BABCOCK & WILCOX TUBES

HOT FINISHED
COLD DRAWN

ALLOY STEELS
CARBON STEELS

THE BABCOCK & WILCOX TUBE COMPANY
BEAVER FALLS, PA.

TA-1230

WHERE PLATE IS WELDED

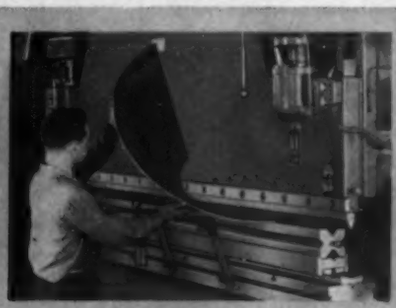
A STEELWELD IS NEEDED . . .

Whether you make army tanks, boilers, railroad cars, ships, machinery or airplanes, if you work with metal from 12 gauge to one inch thick, most likely you have great need for a Steelweld Bending Press.

Steelwelds are versatile tools that perform many types of work quickly and easily, whether only one piece or a production run is required. Long, sharp welded corners can be replaced by quickly made, smooth, round, bended ones, and both appearance and strength improved. Illustrated below are some of the many kinds of work that can be performed on any Steelweld.

It will pay you to investigate the many possibilities of this modern metal-forming tool that is improving product appearance and saving time and money for many enthusiastic users.

Corrugating and any straight-line production bending can be done to hairline accuracy.



Conical sections are quickly formed with standard bending dies by use of the ram-tapering mechanism.

Large diameter holes can be punched singly. Bolt holes and other holes can be punched 25 to 150 at a time.

GET THIS BOOK!

CATALOG No. 2002 gives complete construction and engineering details. Profusely illustrated

THE CLEVELAND CRANE & ENGINEERING CO.

1125 EAST 283RD ST. WICKLIFFE, OHIO.

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GENERAL SALES AGENTS: THE CYRIL BATH CO., E. 79TH & MACHINERY AVE., CLEVELAND

No Production Delays

-- with this Shuttle Table Press

A steady stream of airplane parts flows *uninterruptedly* 24 hours a day from this big Birdsboro Hydraulic Press. There are no delays, no holdups. The press never needs to wait for loading —the four conveniently arranged shuttle tables, which provide access to the press from *all* sides, see to that!

Loading and pressing operations are fully synchronized and automatically controlled to minimize the strain on operators and to provide the utmost in safety.

Engineered to produce the volume quantities demanded today, this big Birdsboro Press also has the flexibility to handle the many different kinds of work that will be its job when Victory is achieved.

If *yours* is a press problem, of the present or future, it will pay you to consult Birdsboro. If you desire, our engineers will be glad to work with yours, right from the start!

Patents Applied for

BIRDSBORO STEEL FOUNDRY AND MACHINE COMPANY • Birdsboro, Pennsylvania

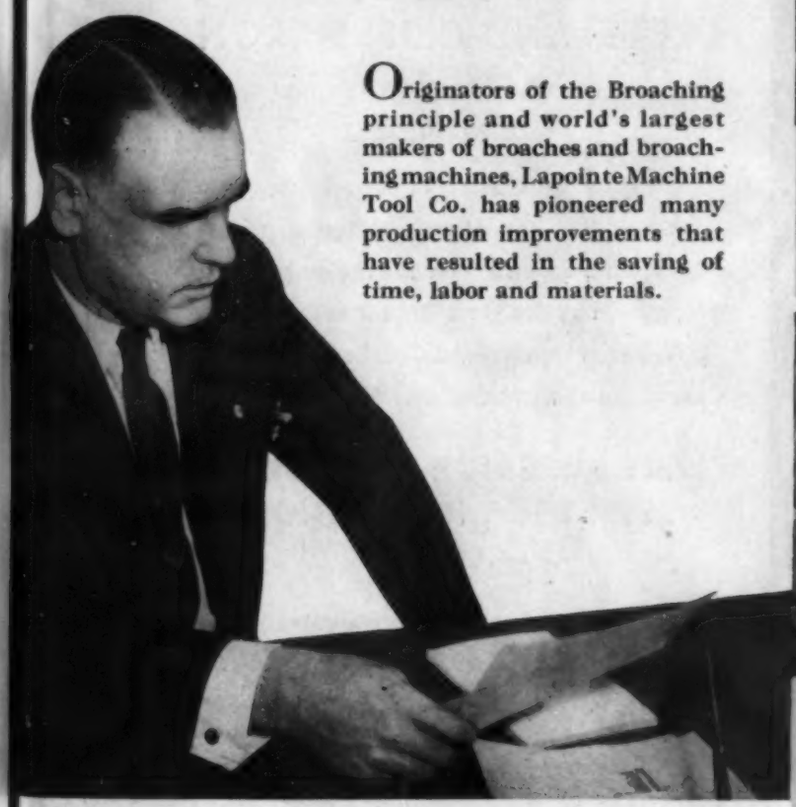
BIRDSBORO

HYDRAULIC PRESSES

CUTTING TOOL TIPS FROM THE TOP-NOTCHERS—#5

"To insure good broaching results, broach, machine and set-up must be handled with utmost care,"

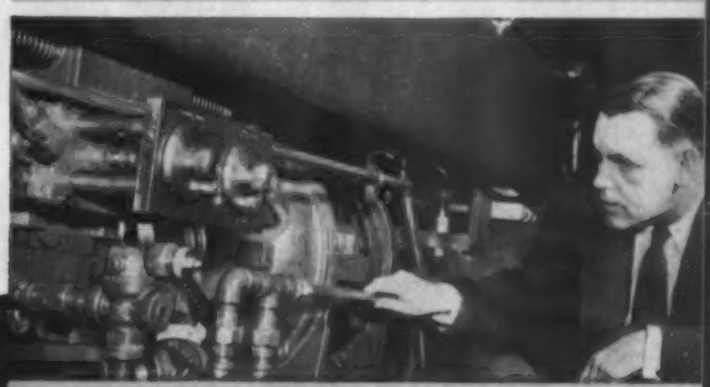
says JOHN J. PRINDIVILLE, Jr., Vice-Pres.
Lapointe Machine Tool Company
Hudson, Mass.



Originators of the Broaching principle and world's largest makers of broaches and broaching machines, Lapointe Machine Tool Co. has pioneered many production improvements that have resulted in the saving of time, labor and materials.

"The high-grade steel and many precision operations that go into the production of a broach make it an extremely valuable piece of equipment. When not in use broaches should be protected with a rust preventive and carefully packed; either in their original crates or in racks made for that purpose."

"To insure the operating efficiency of machine and broach, the care of the broaching machine should be made a daily routine. Special attention should be given to the selection of the coolant and the hydraulic oil used. In the above photograph Mr. Cambria, our design engineer, points out the features of a gun-rifling machine."



"While most broaching machines have one-shot oilers, proper lubrication is still an important function, as is the proper setting of stops and controls. Most job set-ups on our machines are relatively easy to do because of special fixtures. However, constant care in setting up fixtures and putting in pieces will save unnecessary spoilage of both piece and broach."

The correct cutting oil is as important to proper broaching operations as the correct care and operation of the broach and the machine. That's why Shell has developed a control technique that "balances" the oil to the machine, the application and the tool. Call in the Shell man now for details.

SHELL

SHELL LATA OILS
FOR METAL WORKING

"To determine whether or not a job can be broached, complete information as well as prints and samples of the job must be thoroughly checked. On the particular machining job being discussed, estimates show over 50% can be saved by broaching."

WHEN *the* 33*rd* STAR *was* ADDED!

THE
CLEVELAND-CLIFFS IRON
COMPANY
was founded

1850 California was admitted to statehood and development of the Lake Superior Iron Ore region began. Now, as in all the years since that date, the resources of The Cleveland-Cliffs Iron Company are at the command of American industry.

LAKE SUPERIOR IRON ORES
VESSEL TRANSPORTATION
• • • COAL

CCC

THE CLEVELAND-CLIFFS IRON CO.
CLEVELAND • • OHIO

What can we do

WITH

ALL THESE MACHINES?

Foreseeing Victory in the war, some of the doubters are beginning to say "Machine tools are going to be a dime a dozen. We'll have too many."

But wait.

By 1944, we shall have a dammed-up market for twice as many new automobiles as any one year has ever produced. And the whole world will be after all the surplus we can turn out.

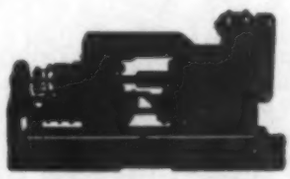
Today, less than a quarter of American farms are mechanized, and only 1% in the whole world. Few have all the tools they need. We are not now making enough implements to replace those that are wearing out.

And even our enlightened country needs millions of modern houses. We have made just a start toward real convenience, health and safety in the home.

Every day sees more of our living equipment worn out—and our post-war backlog of demand increased.

Filling this demand is the job that Acme-Gridley Bar and Chucking Automatics will do—machines that are built to produce high quality metal parts in great volume, at low cost.

Low-cost production *must* be the basis of sound and lasting prosperity. Acme-Gridleys began, 40 years ago, to prepare for that.

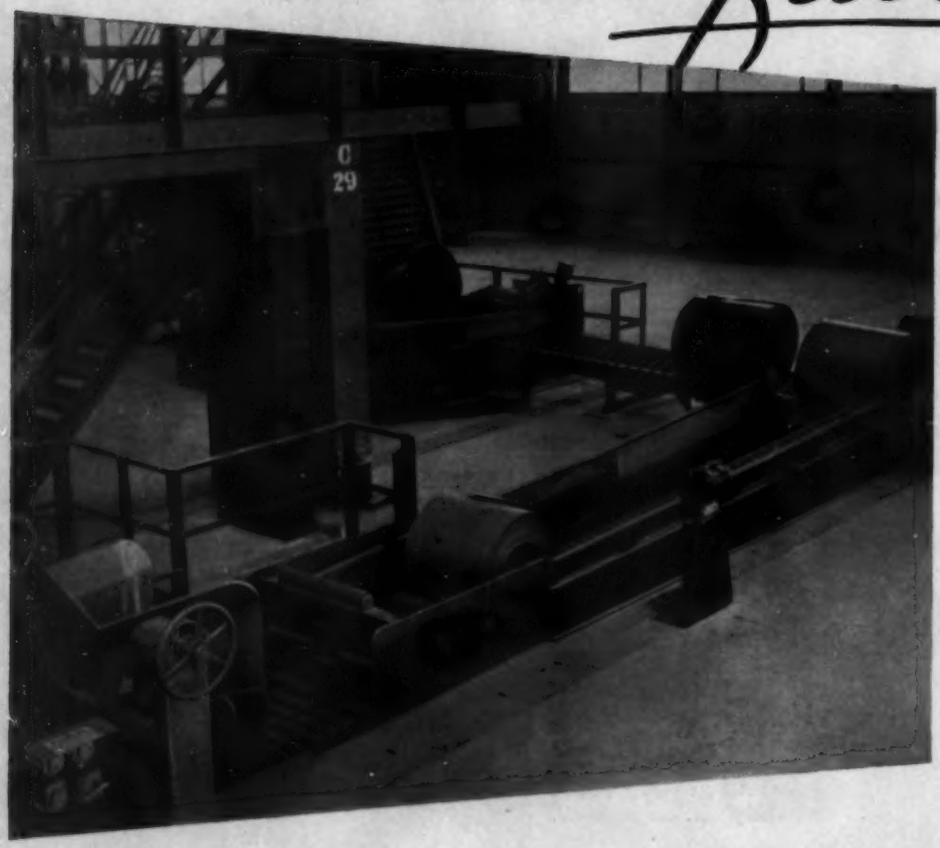


ACME-GRIDLEY AUTOMATICS maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

The NATIONAL ACME *Company*

CLEVELAND · OHIO

DISH IT OUT *faster!*

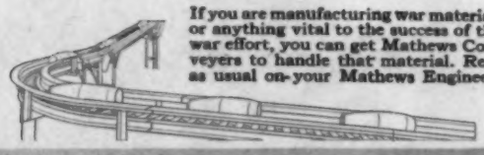


THAT'S THE WAY TO WIN this war . . . and that's the way to speed the production of vital war material.

Keeping materials, parts and supplies moving to waiting machines and eager hands with a Mathews Time-Controlled Conveyer System is a sure-fire means of making production schedules "click."

Mathews Engineers are helping American War Industries dish it out faster; perhaps they can also help you.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

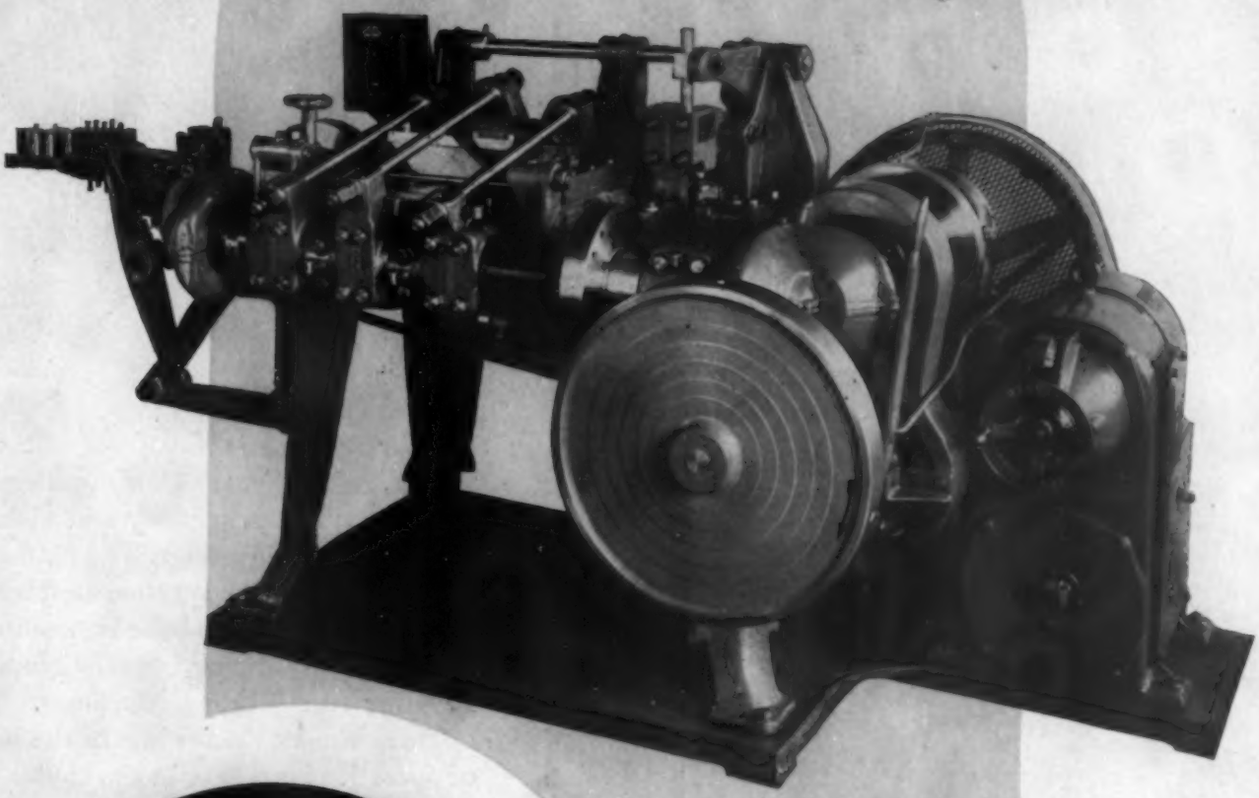


If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

NILSON

automatic metal wire forming machine

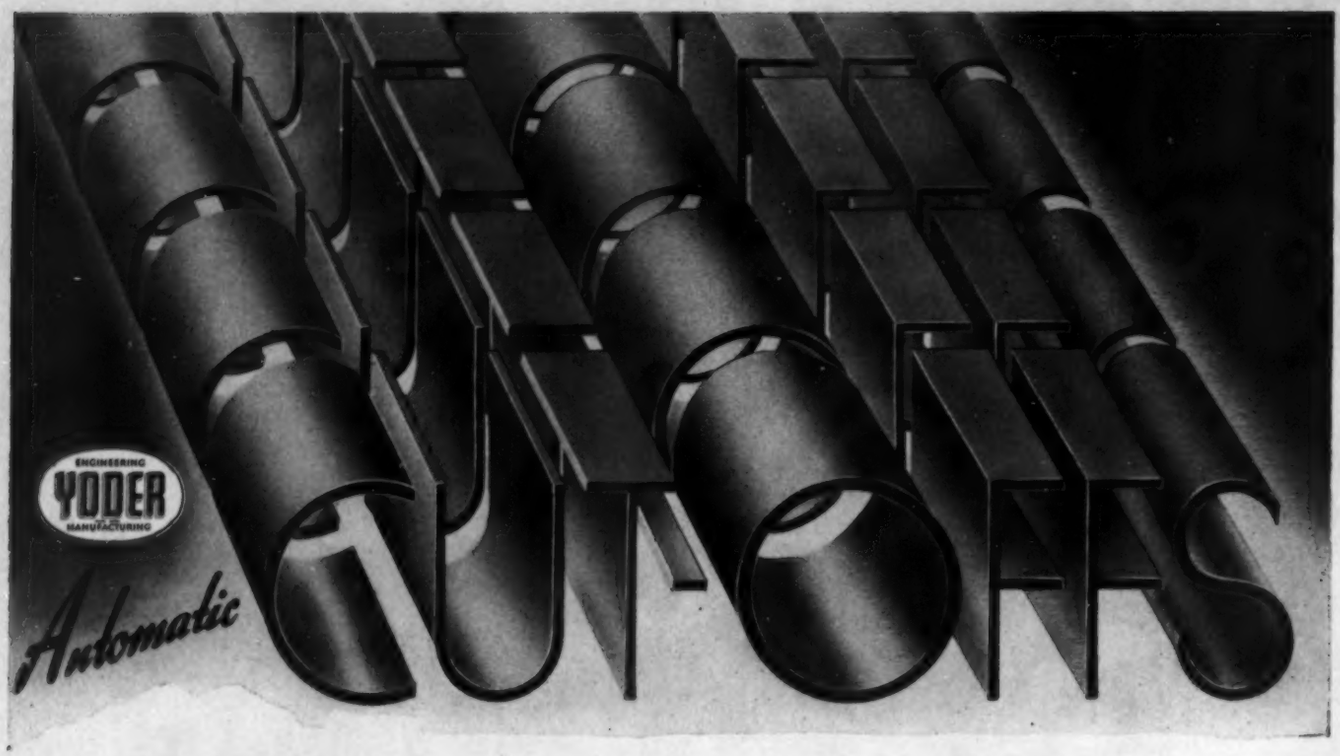


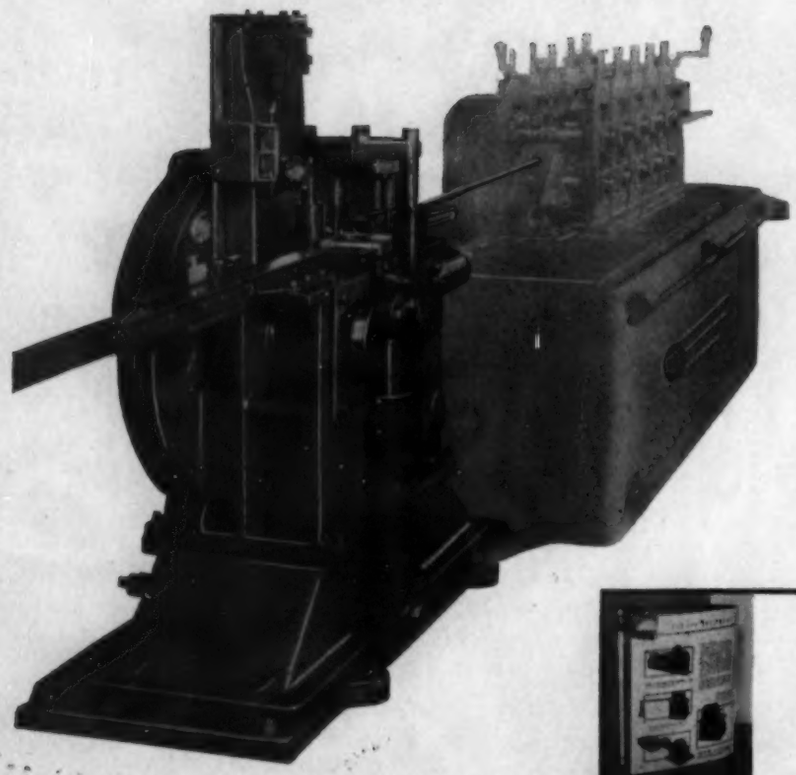
The Nilson line includes machines for forming paper clips, buckles, gate hooks, coat and hat hooks, ceiling hooks, wire ears, cable rings, screw eyes, sash chains, automobile slide chains, flat open link chains, staples, cotter pins, hose clamps, etc. Nilson also makes wire straighteners, wire reels, frame bending machines and special presses.

The machine pictured here is a simple and ingenious contrivance. Sturdy, solid, compact, requiring little space, it is a highly efficient and practical machine for forming wire and punching patterns from ribbon stock. Various patented features and extra attachments make it a necessary factor in reducing the manufacturing cost of your product. The Nilson automatic metal wire forming machine turns out the work faithfully, accurately and speedily—and it functions a long, long time free from repairs and replacements.

THE A. H. NILSON MACHINE COMPANY

BRIDGEPORT, CONN.





"Yoder Automatic Cut-Offs" cut off tubing, moulding, wire rods and strip metal, accurately, speedily and with a comparatively light burr. The cutting-off operation can be synchronized with the forward motion of the entire line-up of Roll-Forming, Straightening, Leveling and Welding Machines.

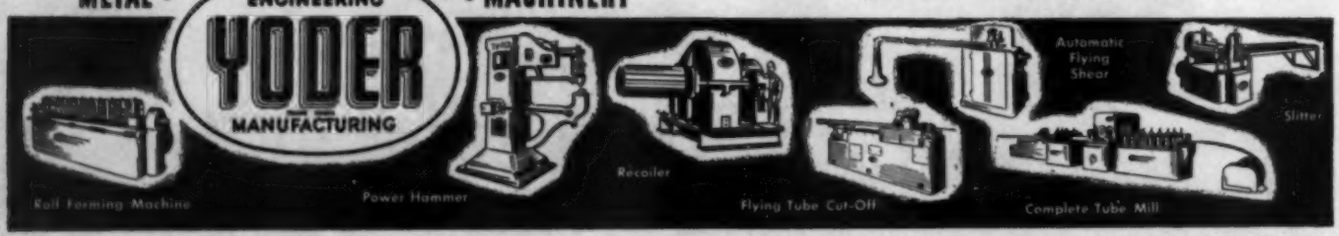
This machine stands last in the line of operations but first in the choice of necessary auxiliary equipment. For "TOTAL" quality roll-forming production, USE YODER ROLL-FORMING MACHINES AND YODER AUXILIARY EQUIPMENT.

If you write, we'll send you our new general catalogue, with a part devoted to our complete line of Cut-Off Machines. If you give us a few details, we'll send a "proposal" with prices and recommendations.

METAL • FORMING • PRODUCTION • MACHINERY

ENGINEERING YODER MANUFACTURING

THE YODER COMPANY
CLEVELAND, OHIO, U. S. A.



NEED STEEL?

Call us

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GENERAL PURPOSE STEELS

Steel Products, Tools, Machinery and Equipment

A call to us may solve your problem. Many such calls have kept vital war production from being stopped for lack of some piece of steel—or some piece of machinery or equipment. If we have what you want, it can be yours *in a hurry*—subject, of course, to priority restrictions. If we don't have it, we'll do everything we can to help you find a source of supply. Try us—note addresses, phone and teletype numbers at right.

NATIONAL EMERGENCY ALLOY STEELS

These new steels have made it possible to meet the critical conditions imposed by the shortages of strategic alloys. They have given satisfactory results—in fact, have sometimes out-performed steels previously used.

We welcome your inquiries. We'll gladly assist you in determining the grades best suited to your needs. Phone, wire or write our nearest warehouse.

AIRPLANE STEELS

Our Chicago Warehouse has been designated by the War Production Board as a warehouse to distribute the aircraft materials listed below. They are for use in airplanes and available at our Chicago Warehouse only.

WD-X-4130 SHEETS. Open Hearth, Normalized, Pickled and Oiled to Spec. AN-QQ-S-685, Condition N. All gauges .016 to .50, sheets 18 x 72".

NE-8630 SHEETS. Open Hearth, Normalized, Pickled and Oiled to Spec. AN-S-12, Condition N.

STAINLESS STEEL BARS.....Spec. AN-QQ-S-771.

STAINLESS SHEETS .....Spec. AN-QQ-S-772. Spec. AN-QQ-S-757.

WRITE, PHONE OR WIRE, if you are eligible for these Airplane Steels, to United States Steel Supply Company, P.O. Box MM, Chicago, Ill. Telephone BRUnswick 2000 — Teletype CG. 605.

UNITED STATES STEEL SUPPLY COMPANY

(formerly Scully Steel Products Company)

UNITED STATES STEEL SUPPLY COMPANY

USS

STEELS

SERVICE

UNITED STATES STEEL

Circle Ⓛ Heat Treated Carbon Steels

"Pinch Hit" for Critical Low Alloys

HAVING trouble obtaining critical low alloy castings? Investigate the possibilities of Circle Ⓛ Heat Treated Carbon Steels! These steels meet specifications for machinery, structural and other castings where high strength is extremely important.

Lebanon's heat treatment of Circle Ⓛ Carbon Steels develops nominal ductility and impact resistance as well as high strength. Physical properties are excellent. Circle Ⓛ-A will meet many war production requirements. Circle Ⓛ-C and Ⓛ-D are satisfactory emergency "pinch hitters" for low alloy structural steels.

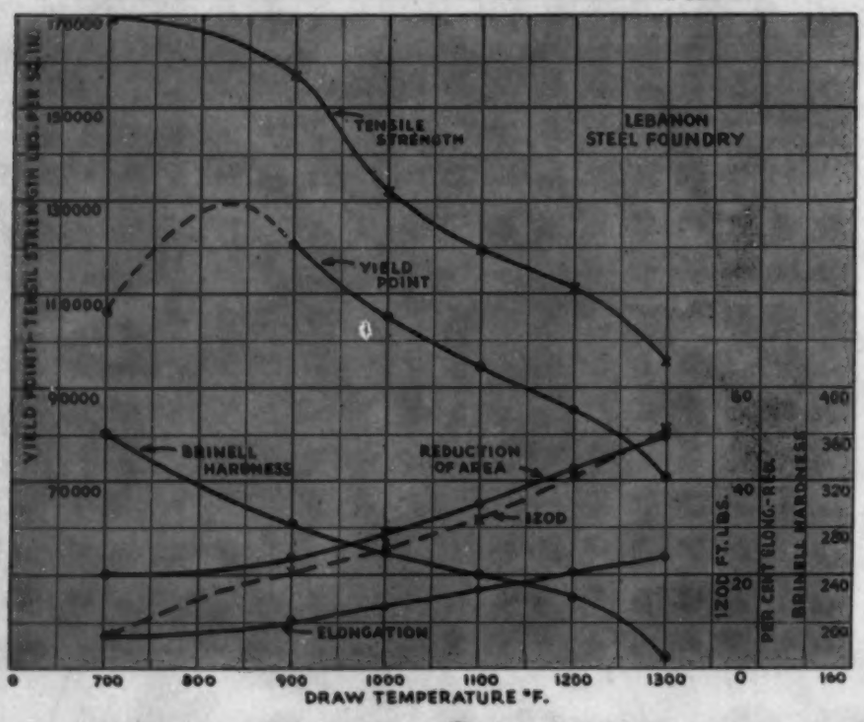
Lebanon offers these emergency materials to aid war industries who require critical low alloy steels but who cannot extend the necessary priorities to procure critical low alloy steels.

Lebanon foundry engineers and metallurgists have had close contact with war production requirements since the beginning. Their experience in solving today's type of industrial problems is available to interested organizations.

LEBANON STEEL FOUNDRY
LEBANON, PENNA.

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

AVERAGE PHYSICAL PROPERTIES OF CIRCLE Ⓛ HEAT TREATED CARBON STEELS AFTER WATER QUENCHING FROM 1525° F. AND DRAWN AS SHOWN*



SPECIFICATIONS MET BY LEBANON Ⓛ EMERGENCY CARBON STEELS

Regular Heat Treatment												
LEBANON DESIGNATION	FEDERAL SPECS.	U. S. NAVY SPECS.	S.A.E. SPECS.	A.S.T.M. SPECS.	NOMINAL ANALYSIS C.	Si.	Mn.	HEAT TREATED TO GIVE FOLLOWING PHYSICALS (MIN.) T.S.	Y.P.	EL.	RED.	B.H. (Avg.)
Ⓛ-A	QQ-S-681b Class 3	49-S-1 Class A	1040	A-27-39 Grade H-1	0.40	0.40	0.70	80,000	40,000	17	25	170
HIGH TENSILE—Special Heat Treatment—(Liquid Quench and Draw)												
Ⓛ-C*					0.40	0.40	0.70	100,000	75,000	15	30	200
Ⓛ-D*					0.40	0.40	0.70	125,000	85,000	10	20	250

*Restricted to 1½" sect. max.

Lebanon
STAINLESS AND SPECIAL ALLOY
Steel Castings

We Also Manufacture

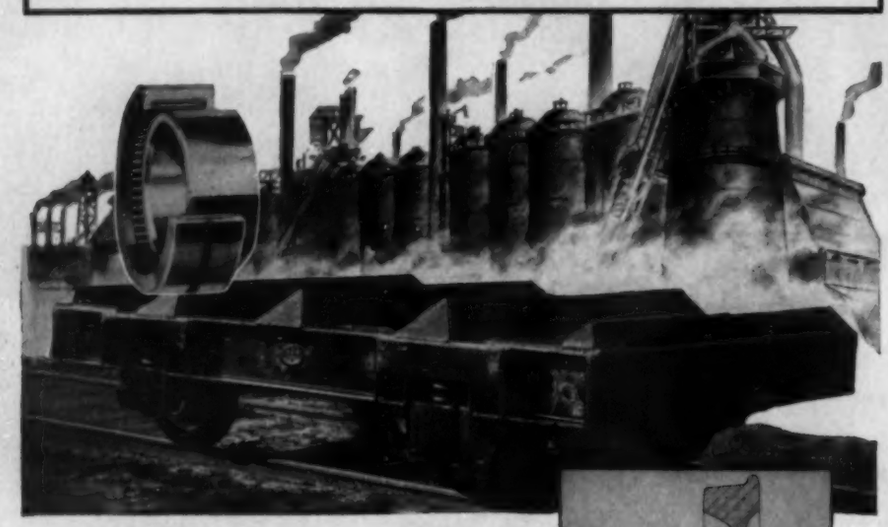
Straightening, Burnishing and Sizing Machines
Galvanizing Equipment for Pipe
Small Seamless Tube Mills
Tube Cutting-off Machines
Butt Weld Pipe Mills
And complete line of Equipment for the finishing of pipe

This machine is giving increased production of vital war work in steel mills throughout the Nation. It will take the punishment of hard continuous service without stress or strain, and can be depended upon to cut costs. Easy to operate — built in four sizes, to accommodate a wide range of tube diameters from $\frac{3}{8}$ inch O.D. to 16 inch O.D., furnished either with or without hydraulic system.

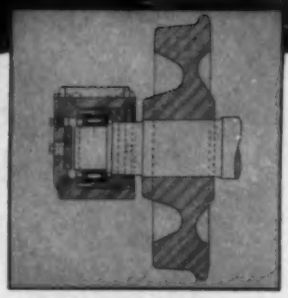
TAYLOR-WILSON MFG. CO.

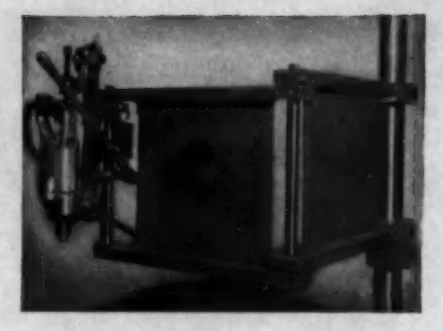
15 Thomson Ave. *(Pittsburgh District)* McKees Rocks, Pa.

IN THE NEWS
WITH TORRINGTON—BANTAM

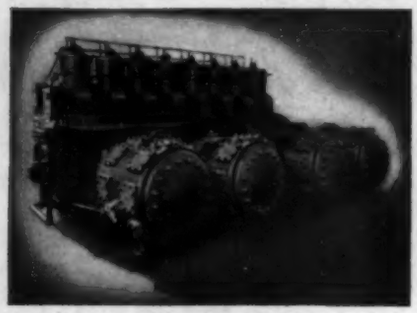


25 TONS OF CHARGE are carried by buggies like this one, to feed the steel furnaces at the Kaiser plant on the West Coast. Constructed by the American Car and Foundry Company, these cars employ Needle Bearings Type NCS on the axles, as shown in drawing. Efficient service is contributed by the low friction coefficient, high load capacity and effective lubrication method of these bearings.





DRILL PRESS OPERATION was obtained in this Black & Decker portable drill through the development of a radial arm attachment to speed production in an airplane factory. Compact arm design and flexibility over a wide radius of operation are combined with anti-friction performance through the use of NCS Needle Bearings—a typical case where the small size and high load capacity of these bearings have proven important advantages.



NO TIME FOR SHUTDOWNS in the oil industry—and these sturdy two-cycle, gas-engine-driven compressors built by Clark Bros. Co. Inc., are designed for service 24 hours a day. Type NCS Bearings are used in the wrist pins of the scavenging pump crossheads where the high load capacity of these bearings assures smooth, reliable performance. A catalog containing complete data on our line of Needle Bearings will be gladly sent upon request. Just write for Bulletin H-104.

NEEDLE BEARINGS FOR ALL PURPOSES, as well as special and standard anti-friction bearings of every type, are available from one source through the combined facilities of Bantam and Torrington. Here, too, is experienced skill to serve you in the unbiased selection or design of bearings to meet any requirement. For the utmost satisfaction in the solution of *your* bearing problems, TURN TO BANTAM.

FARM PLANTING is made easier by this heavy-duty "Rototiller" which prepares seed beds all ready for planting in a single operation. Needle Rollers Type LN are assembled into economical, high-capacity anti-friction bearings on both ends of the connecting rods and on the wheels of this progressively designed unit. The rollers at the wrist pin end are projected beyond the connecting rod in such a way that they are constantly lubricated by a fog of oil from the crankcase. At the lower end, oil catches are used.

ARMY E NAVY

TORRINGTON BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION

SOUTH BEND, INDIANA

Courtesy Bell Aircraft Corp.

Tips on finishing transparent plastics

THE aircraft manufacturing industries face special problems today in the finishing of transparent plastics. Therefore, an understanding of the abrasive products and methods of use best suited to their solution is important.

The picture above shows a process employed by Bell Aircraft Corporation using a Carborundum Brand Silicon Carbide cloth sleeve to finish the edges of enclosure sections for Airacobra cockpits. Abrasive discs, sleeves, belts and sheets are all widely used throughout the aircraft industry to meet the various finishing conditions encountered.

For best results in most edging operations, sanders should be operated at about 3,000 feet per minute. In general it is better to use a wet sanding process than a dry, in order to reduce heat, settle dust, eliminate loading of the abrasive surface, speed cutting and increase abrasive life. For surface finishing it is well to select as fine an abrasive as possible. One just fine enough to remove any scratches left by the previous operation is usually the right choice. This is a typical example of an operation employed on one of the newer materials of construction. In metal finishing operations, Aloxite Brand Aluminum Oxide in its various forms—discs, sleeves, belts and sheets—is used extensively.

Whatever may be your use of abrasives, we ask you to remember one thing: every abrasive tool is a "Weapon for Production"; it's important to use it wisely.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

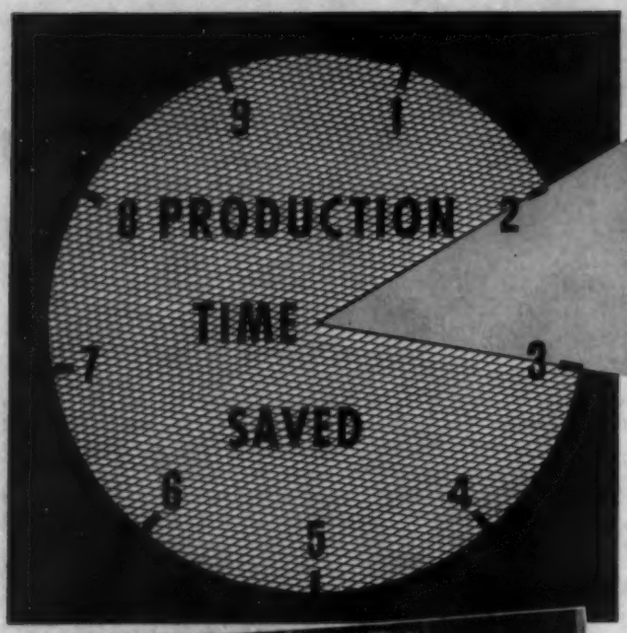
THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

REG. U. S. PAT. OFF.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)



Production Increased 800%

The height of the stack of eight wheels, in the lower picture, compared to the height of the one wheel, shows the *relative* increase in the number of these wheels finished per day, now and formerly. The operation consists of turning the outside diameter, from rim to rim. Formerly, this was done on standard lathes. By putting the job on Monarch-Keller lathes, with electric controls, production was increased 800%. By this method, a thin metal template is drawn over an electrically controlled tracer, and the cutting tool *automatically* follows the specified contour, thus permitting greatly increased speed and accuracy of production.

Monarch-Keller lathes are similarly increasing production of many and varied kinds of war work. If we can help you select the right tool for the right job, we'll gladly work with you.

THE MONARCH MACHINE TOOL CO. • • • SIDNEY • OHIO

MONARCH LATHES *Save Time*

Photographs by courtesy of Hayes Industries, Inc.

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STEEL

The Magazine of Metalworking and Metalproducing

JUNE 21, 1943

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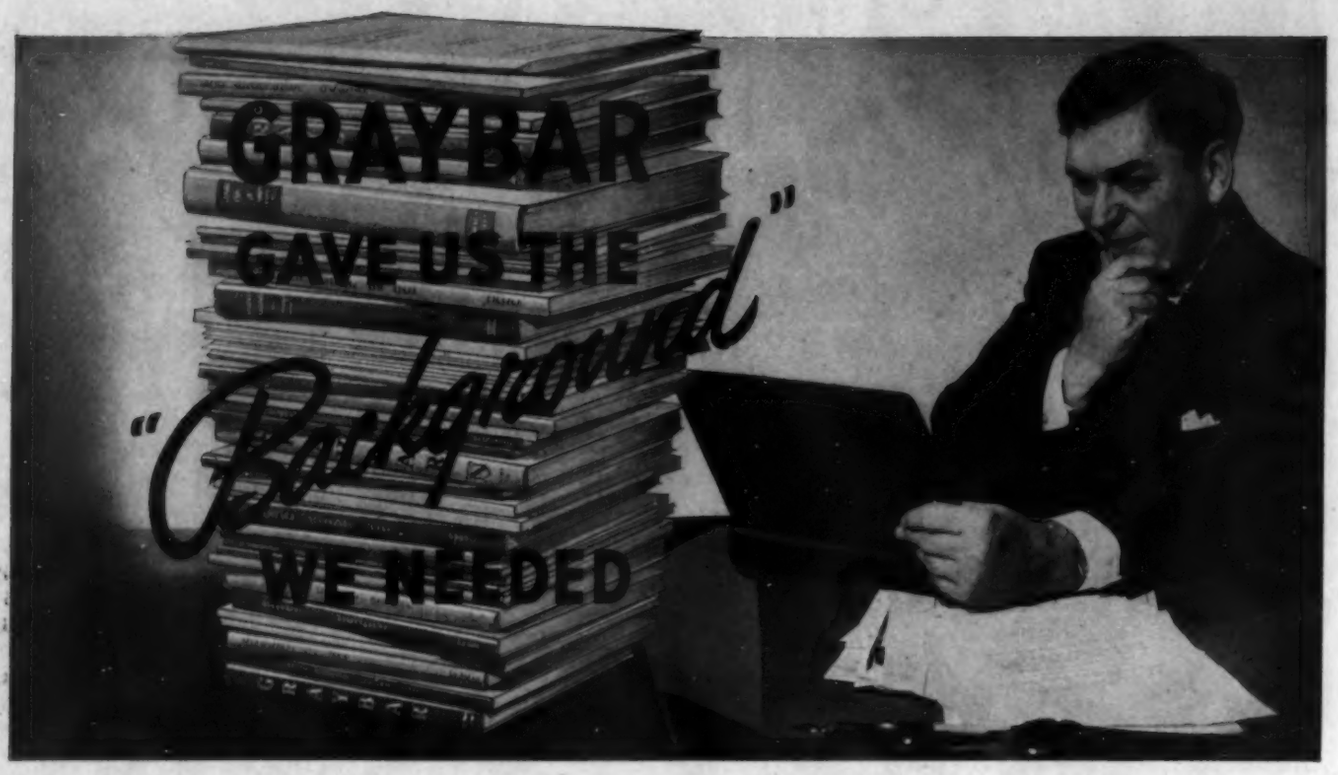

...when we switched to a new line of work

Another example of the time-saving gains of the Graybar MM* Plan

A new contract for war equipment put a Midwestern manufacturer on the spot. Although the firm was well equipped to build the new item, certain of the parts it required were of a type completely new to their purchasing staff.

Contact with Graybar, however, filled the gaps in their procurement "know-how". A GRAYBAR Representative was quick to supply the facts and figures they lacked on priorities, deliveries, specifications, prices. "Your Company," they later wrote, "has been unusually helpful in enabling us to obtain critical items used in our product, which were completely new to us in our new field of work."

Other companies switching from one product to another as a result of changing war demands are finding GRAYBAR unusually helpful in this respect. If the new product involves any type of electric circuit, or uses electrical parts or subassemblies, contact with GRAYBAR can tie you in with over 200 leading suppliers. You get prompt, authentic information on their standard items, and their facilities for special jobs. Often, too, you get favorable delivery from GRAYBAR'S local warehouse stocks right in your own community.

***Serving as your MATERIALS MOBILIZER**

By this GRAYBAR service, your electrical needs are linked to the available output of 200 manufacturers, mobilized locally at more than 80 warehouses. The MM Plan "dovetails" GRAYBAR'S procurement work with your own purchasing requirements. You save time in getting estimates, checking specifications, expediting delivery, locating "hard-to-get" items. Ask your local GRAYBAR Representative how this "one-call" service can help you.

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"Graybar" Everything Electrical . . . . THAT IT TAKES TO WIN!

AS THE EDITOR VIEWS THE NEWS

STEEL
June 21, 1943

WHO WORKS FOR WHOM? A few days ago our county observed its first full dress daylight air raid alert. In most downtown buildings, including our own, people left their desks, went to designated "safe" areas and otherwise co-operated wholeheartedly in the test.

Across the street hundreds of employes in a federal government agency stopped work and hung out the windows during the alert. Apparently they had no organization for air raids. Several weeks ago one of the worst offenders in a night air raid alert was a local office of another federal agency.

Not long ago we had occasion to visit the palatial offices of still another federal agency. Hundreds of government employes were milling about in confusion. It reminded one more of a crowd at a football game or a race track than of a group of office workers performing their duties.

The net result of these experiences is this question: Are these federal employes working for us taxpayers, or are we working for them?

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WAR PROGRAM CLICKS: No one can read Donald M. Nelson's progress report on war production (p. 58), addressed to President Roosevelt, without feeling a sense of pride in the record already achieved and a determination to meet successfully the challenge of the big job which lies ahead.

War expenditures in 1943 will approach $106,000,000,000, of which $84,000,000,000 will go for the munitions and construction program. Of this amount, $11,000,000,000 represents the cost of construction—plant and equipment—while the remainder, about $73,000,000,000 is for munitions.

This expenditure for munitions alone represents an increase of nearly 125 per cent over the outlay for munitions in 1942. However, this increase is exceeded in the case of certain important items of munitions. For instance, the 1943 output of combat planes will be three and a half times that of 1942.

The progress report indicates clearly that the day of smooth-running mass production of munitions is here and that the peak of preparation—of plant construction and of initial tooling up—has been passed. Major problems still lie ahead, but on the basis of what has been done to date, industry can look forward to the new tasks with confidence. A good pattern for production has been developed.

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PERVERSE ACTS OF GOD: We have an idea that the weather is becoming involved in a greater degree than expected in the ups and downs of this war. Already such "acts of God" as extreme cold, excessive heat, fog, wind, rain, drought, mud, sand, snow, floods, monsoons and even earthquakes have interfered with military plans on the fighting fronts. Recently, perverse demonstrations of the elements have been playing havoc with activities on the home fronts.

First it was the late winter, which handicapped the railroads and seriously delayed the opening of navigation on the Great Lakes. Next it was the abnormal rains of May, which probably have reduced food production more than has been admitted officially. Now it is a combination of freak weather conditions, causing fog, which has contributed to an almost unbelievable series of mishaps to iron ore, coal and grain carriers on the lakes.

During the past two weeks, 13 vessels of the lake fleets have been damaged seriously. Three have been sunk. Shipping men say the accidents have reduced the iron ore movement for June (p. 82) by more than 700,000 tons.

Collisions were responsible for most of the damage. Perhaps the war's effective detector—radar—will find useful applications on the lakes after the war.

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POSTWAR COMPETITION: In Washington, WPB has assembled an interesting exhibit (p. 67) of paper and paper products now in use as successful substitutes for metals and metal products. Anyone viewing this exhibit is likely to wonder as to how much these paper substitutes will encroach upon the markets for ferrous and nonferrous metals after the war.

Articles in the newspapers tell us that in the near

(OVER)

future our window screens will be made of nylon instead of metal wire. In the iron, steel and metal-working industries one hears much speculation (p. 71) as to whether or not the light metals—aluminum and magnesium—will replace steel to an appreciable extent in postwar construction.

Producers and manufacturers are advised not to jump to unwarranted conclusions in regard to post-war competition. One official, when asked what his company has learned from its postwar planning activities, replied that it had found out that it could quit worrying about postwar competition from certain materials and should concentrate on a few which offer real threats.

This is progress.

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ARE PARTS OF ONE JOB: Some high officials in Washington are quietly counseling their friends in industry not to make the mistake of allowing their enthusiasm for postwar planning to deflect them from doing the best possible job of producing for victory.

This advice is sound. It would be unfortunate, indeed, if the emphasis now being placed upon "winning the peace" were to interfere in any way with the No. 1 job of winning the war. We believe most industrialists understand this.

We suspect that such qualms as exist in regard to the alleged over-emphasis on postwar planning arise from the publicity attending the subject rather than from the time and attention actually being devoted to it. As a matter of fact, for every individual in industry engaged entirely in postwar planning there are thousands or tens of thousands who are devoting their undivided attention to production.

War is an extreme emergency. It hits a nation just as a devastating fire hits the owner of a home or a business. When fire sweeps the premises, the owner first is concerned with the preservation of life and property. He does what he can to see that all persons are evacuated safely, that valuables are carried out and that adequate fire fighting facilities are on the scene. As soon as he is satisfied that the rescue and fire fighting jobs are in competent hands and under control, his thoughts turn to rehabilitation. What can he do to speed the resumption of normal activities?

The same rule applies to war. We make sure first that we are doing everything possible to win. Satisfied on that score, we turn to thoughts of rehabilitation.

Perhaps our thinking will be clarified if we will consider that winning the war and winning the peace are integral parts of one gigantic task. The emergency of a fire is not over when the fire is out. It is over only when normal activities have been restored. In war, the emergency is not over when the armistice is signed. It is over only when stable economic conditions have been restored.

Viewed in this light, production for war and post-war planning go hand in hand.

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EMPHASIS ON SINTER: Although the sintering of iron ore concentrates dates back almost to the turn of the century, it is doubtful whether the process ever has attracted as much attention as at the present time. Many blast furnace experts believe that their industry is on the threshold of a new era in which there will be a marked increase in the use of beneficiated iron-bearing materials. Sintering will play an important part in this development.

Until now, the use of sinter as a major part of the blast furnace burden has been confined to a few stacks in the East. Recently, however, operators in other districts have manifested keen interest in increasing the use of sinter. This, coupled with the certain knowledge that the industry cannot go on using rich ores at the present rate, has turned the spotlight of attention upon the roll of sintering in blast furnace operation in the future.

This new emphasis makes pertinent a re-evaluation of the thermal problems of the sintering process and of the details of sintering plant design. The series of articles on this subject by Charles E. Agnew, which is concluded in this issue (p. 103), merits close reading by every person interested in blast furnace operations. Sintering seems destined to play an exceedingly important role in the next decade.

E. L. Shaner

EDITOR-IN-CHIEF

Better Steels are Coming— from the Tests of War

Hour after hour, month after month, Inland metallurgists study not only the needs for this war of steel, but also the requirements of a victorious America—the America that will turn again to peacetime developments in the crafts, and in the sciences—new developments that will prove again that free peoples set the pace for others to follow. Coming out of the tests of war are finer steels—steels that will set new standards of safety and speed in transportation. Steels that will help bring the newest advancements in swift communications into most homes in the land. Steels that will bring new conceptions of beauty, convenience, comfort, and utility—all at prices that can be afforded by the average American. Yes, you can look forward to the day when steel from Inland, now flowing 100 per cent into war products, will help build a greater America.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago, Ill. • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City

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In receiving the joint citation of the Army and Navy the men and women of Eclipse recognize that the award carries with it not only an honor but a responsibility. The coveted "E" Award flags flying above the two Eclipse plants inspire a patriotic glow in the heart of every Eclipse man and woman . . . an inspiration to an even greater accomplishment in our common objective . . . VICTORY! Our customers are assured that Eclipse employees will continue increasing and INCREASING the flow of Eclipse Cutting Tools until this war is safely over.

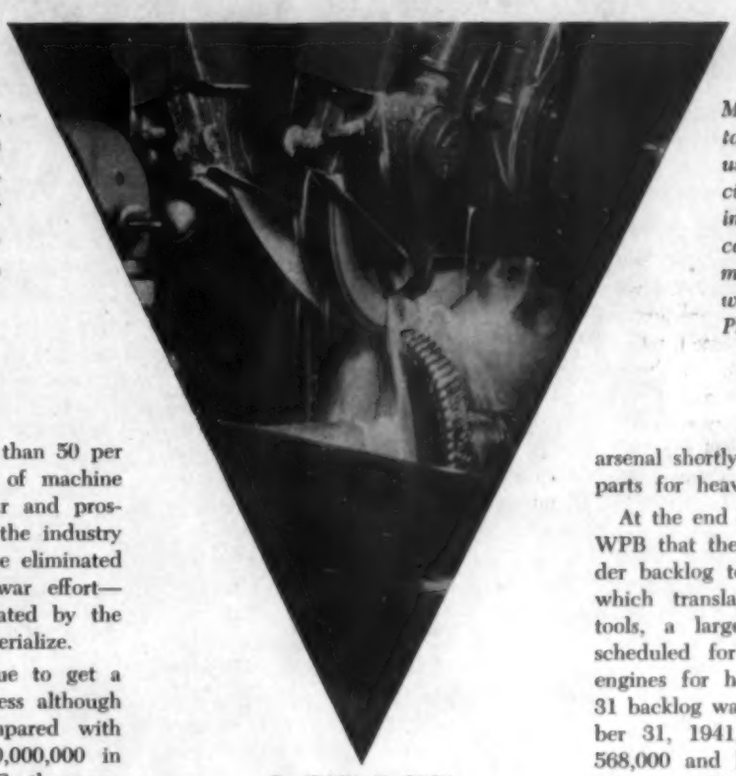
Eclipse

ECLIPSE COUNTERBORE COMPANY

TWO COMPLETE PLANTS IN DETROIT AND FERNDALE, MICHIGAN

Industry Faces Adjustment

Facilities assured continued active operation in War Program despite declining order backlogs . . . Subcontracting planned to take up slack



Mass production of machine tools for war has intensified use of high production precision equipment within the industry itself, broadening conversion possibilities of machine tool plants to other war and postwar purposes. Photo courtesy Pratt & Whitney

By IRWIN H. SUCH
Eastern Editor, STEEL

DESPITE a cut of more than 50 per cent in the order backlog of machine tool builders since last year and prospects of further reduction, the industry need have no fear it will be eliminated from participation in the war effort—if plans now being formulated by the War Production Board materialize.

The industry will continue to get a substantial volume of business although materially reduced as compared with the record total of $1,600,000,000 in orders placed during 1942. Furthermore, a new facilities group now being set up by WPB will aid the industry in obtaining subcontract work. Closely associated with this group will be George H. Johnson, president, the Gisholt Machine Co., Madison, Wis., and until recently director of the Tool Division, War Production Board.

Top WPB officials find it impossible to estimate accurately likely volume of new machine tool business but figures released to STEEL show that the total for the first four months this year was in excess of $250,000,000. If this rate is maintained for the remainder of 1943—which is unlikely—the total for the year will be in the neighborhood of $750,000,000. This figure is given some credence by the private "guess" of a WPB vice chairman that some $600,000,000 worth of machine tools will be placed in 1944.

A factor not to be overlooked in considering future business is the marked increase during the past six months in demand for special purpose tools and a swing away from general purpose tools, attributed to the rapidly tightening labor situation.

War Program Not Static

Even the best informed government experts find it difficult to estimate future machine tool requirements precisely for the reason that the war production program cannot be made static. Experience in Africa has taught the Army and Navy that they can figure on 30 per cent error in type of equipment when actual landings are made on continental Europe. In other words, it probably will be found that equipment now being made in quantity may prove unsuited when the actual land fighting begins on the continent. In Africa, mobile artillery filled requirements not met by tanks and the latter program consequently was cut back. In fact, one huge Detroit tank arsenal shortly will be retooled to make parts for heavy planes.

At the end of May, it is estimated by WPB that the unfilled machine tool order backlog totaled about $600,000,000 which translates into around 100,000 tools, a large number of which are scheduled for delivery to builders of engines for heavy bombers. The May 31 backlog was the lowest since December 31, 1941, when it totaled $576,568,000 and less than half the record $1,389,363,000 total recorded June 30, 1942.

May shipment and new order figures are not yet available but the trend may be noted by referring to the accompanying table, April shipments being twice the rate of new business for the same month. May cancellations were about 20 per cent of new orders. Expressed in terms of numbers, these cancellations have been running at the rate of about 10,000 to 12,000 per month and WPB expects a further cut in the 100,000 total by the end of the current month.

This expectation is borne out by the issuance of a new order making it impossible for either the Army or Navy to make purchases of new tools without specific WPB authority. Both services also have been asked to make a list of tools on order for use by their contractors and those which cannot be conclusively proved essential will be canceled.

Although the outlook for machine tools is less promising, WPB officials

Is this an armory, an aircraft engine plant, a shop making parts for naval equipment? It might be any of these but actually it is part of a machine tool plant. Conversion of such a plant to a wide variety of exacting war work other than machine tools would not be difficult. Photo courtesy Warner & Swasey Co.

emphasize there will be plenty of business for everybody as long as the war lasts and that the peak in production of war goods has not been passed, rather is still ahead. Production is being stepped up month by month and it will be necessary to turn out 61 per cent of the huge $83,000,000,000 goal for 1943 in the second half. Further, programs already known indicate that 1944 volume will be considerably ahead of 1943. Cutbacks in individual items, while disturbing to the plants involved, are considered unimportant in relation to the entire job.

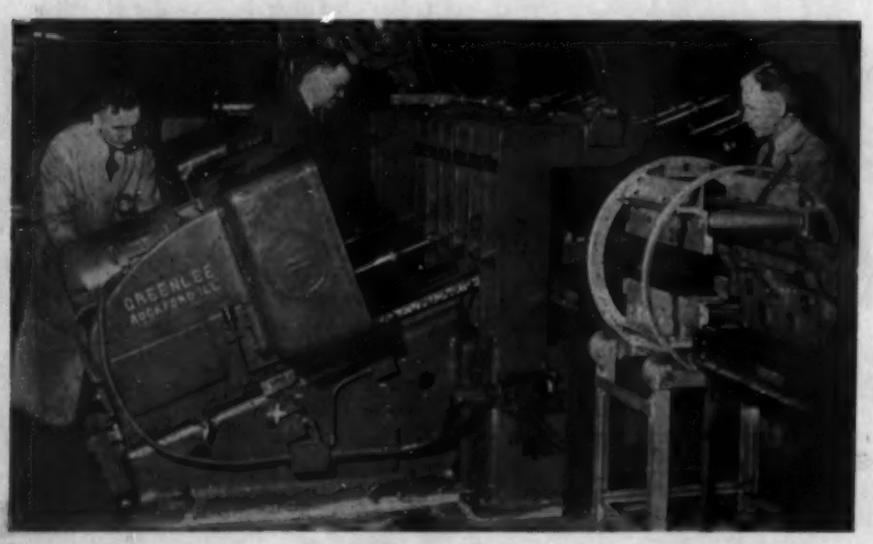
Approximately 75 companies in the machine tool field now are reported by WPB as being in position to take subcontracts. Some already have taken considerable work, including production of valves, Navy turbines, gears, aircraft parts, hydraulic controls, diesel engine parts and the like. A spokesman for WPB said those who have tried have found no difficulty in getting outside work. "Some are aggressive in seeking work", he said. "Others are inclined to sit back".

Precision Equipment Needed

Manufacturing improvisations will be necessary in many cases since the industry predominately uses heavy-type tools, it is pointed out. In these cases, it will be necessary to buy additional precision equipment and small production-type machines needed for special jobs such as involved in making parts in connection with the huge impending heavy bomber program.

Right now, WPB records show that about 5000 machine tools are idle due to changes in production schedules. And, as a means of getting these tools back more quickly into use, the war agency proposes to establish central warehouses where prospective users may actually see them, thus, making it unnecessary to visit individual plants where the tools now stand idle. Similar plans are working well in Canada and England. Principal difficulty involves financial transfers since tools often are owned by one of seven or eight agencies.

The entire machine tool situation is regarded in Washington as being relatively "easy" although a tight situation continues in holding fixtures and attachments for special purpose tools. Excess inventories of cutting tools in the hands of many producers occasioned by cutbacks in individual programs are being studied and it is expected a redistribution plan will be worked out such as has been done within the Ordnance department's own organization.



Changes in design of Army and Navy equipment involve extensive retooling. Many complex special purpose tools such as the station-to-station machine shown here are required. Photo courtesy of Studebaker Corp.

MACHINE TOOL STATISTICS

Source: War Production Board
(000 omitted)

1943	Unfilled Orders	New Orders	Shipments
April	$ 643,643	$ 57,359	$118,031
March	704,922	84,980	125,445
Feb.	893,247	63,865	114,593
Jan.	970,616	48,829	117,384
1942			
Dec.	1,069,672	56,083	131,960
Nov.	1,129,610	76,116	120,871
Oct.	1,168,768	66,474	130,008
Sept.	1,248,965	74,343	119,883
Aug.	1,315,254	96,979	117,342
July	1,374,735	121,156	113,596
June	1,389,363	139,397	111,090
May	1,386,435	166,945	107,297
April	1,367,281	254,274	103,364
March	1,302,803	338,348	98,358
Feb.	1,000,838	127,356	84,432
Jan.	728,708	107,500	83,547
1941			
Dec.	576,568	.....	81,435
Nov.	629,926	.....	81,320
Oct.	616,542	.....	84,178
Sept.	617,677	.....	74,906
Aug.	595,000	.....	70,069
July	572,000	.....	63,019
June	525,000	.....	69,070

Pinch to Continue

WPB vice chairman tells auto group steel supply easement not in early prospect

SPIKING rumors that substantial quantities of critical materials may soon be released for manufacture of civilian peacetime articles, J. A. Krug, program vice chairman, War Production Board, said in an address June 17 before the annual meeting of the Automotive Council for War Production in Detroit that such reports were without foundation.

Total requests for carbon steel under CMP for the third quarter were in excess of 20 million tons, while total supply available was slightly under 15 million tons, compelling an overall reduction of 25 per cent in the requests of claimant agencies, he said.

Army was allotted 500,000 tons less carbon steel than asked for, the Navy 100,000 tons less, Maritime Commission 400,000 tons less.

Office of Defense Transportation will receive only 1,200,000 tons to meet transportation needs against an original request for 2,200,000 tons.

Statistically 70 per cent of carbon steel production for third quarter was allotted to direct military uses, with 18 per cent for such essential needs as farm equipment, railroad utilities, new building construction, oil wells, aviation gasoline plants and synthetic rubber plants. Something more than 5 per cent was for warehousing and maintenance, repair, and operating supplies for industry.

Baby carriages, some pots and pans, cans for food and a limited number of other articles constituted about the only civilian uses of steel permitted.

Krug said his staff has projected steel requirements and supply figures through 1944 and on the basis of those figures foresaw some lessening of shortages by the end of next year, but he predicted that the situation is merely one of distance lending enchantment—that when the time is reached materials will be just as critical as they are today. He added that the United States started out to be the arsenal of democracy but today is the common carrier, the food basket and the corner store for our allies around the world as well.

Present, Past and Pending

■ WAR PRISONERS MAY WORK AT U. S. COPPER MINES

WASHINGTON—Prisoners of war may be used in surface operations at this country's copper mines to ease an acute manpower shortage. It is unlikely they will be employed in underground operations due to danger of sabotage.

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■ OFFICE MACHINES WEARING OUT; DIFFICULT TO REPAIR

WASHINGTON—Office machines are wearing out rapidly, breakdowns are on the increase, and repair parts are difficult to obtain. The draft has taken many service and repair men. Some metalworking companies have been forced to shift machines among branch offices.

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■ ROLLING STOCK SHORTAGE IMPERILS WHEAT MARKETING

CHICAGO—Atchison, Topeka & Santa Fe railroad officials express fears that much of the 1943 half-billion bushel wheat crop may have to be piled on the ground—at least temporarily—due to shortage of rolling stock.

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■ MAY USE IRON FOR PRINTING PLATES

COLUMBUS, O.—Electrolytic iron may become a metal of major importance in making printing plates, according to Battelle Memorial Institute.

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■ BARIUM STAINLESS ACQUIRES MINING CLAIMS

CANTON, O.—Barium Stainless Steel Corp. has acquired 24 mining claims in Pennington county, South Dakota, containing tin, tungsten, mica and beryllium ores and is proceeding to engage in the mining of these strategic materials.

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■ SETS UP SUBCOMMITTEE ON RENEGOTIATION

WASHINGTON—House Ways and Means Committee has voted to establish a subcommittee to study renegotiation of war contracts. Chairman Doughton said the subject probably will be taken up in connection with general revenue legislation later in the year, but that the subcommittee would do considerable groundwork in the meantime.

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■ AUTO INDUSTRY WAR OUTPUT DOUBLE PEAK PEACETIME RATE

DETROIT—Production of war products in automotive plants now is running at double the industry's highest level of civilian output and will continue to increase. This prediction was made by Alvan Macauley, president, Automotive Council for War Production, and C. E. Wilson, president, General Motors, at the council's annual meeting.

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■ FINAL DOW MAGNESIUM UNIT STARTS OPERATIONS

LUDINGTON, MICH.—Ludington plant of the Dow Magnesium Corp., which will supply magnesium chloride to Dow's Marysville, Mich., plant, was opened last week. The Ludington unit is the final link in the Dow-Defense Plant Corp. $40,000,000 project to increase Dow's output of magnesium to 35 times the company's 1939 output.

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■ WAREHOUSES TO GET HEAT-TREATED STEEL BARS

WASHINGTON—Restrictions on delivery of heat-treated steel bars to warehouses will be relaxed by War Production Board, effective Oct. 1.

Wean Enaineering, Case School Offer Courses

The Wean Engineering Co. Inc., Warren, O., is co-operating with Case School of Applied Science, Cleveland, in offering courses in machine detailing and fundamentals of machine design to Warren and Trumbull county, O., residents, R. J. Wean, president of the company, announced recently.

Facilities will be provided by the company at 347 North Park, Warren. The courses are designed to aid in the development and upgrading of employes in engineering departments, shops and drafting rooms as an aid to the war effort, Mr. Wean says. Selected applicants of the industrial area will undergo the training. Tuition will be free but students will provide their own texts and drawing instruments.

Case School is conducting an engineering, science and management war training program and has applied to the United States Office of Education for authority to operate in the area. Applications for admission to the training program can be obtained from Case School or from N. J. Ranney, Wean Engineering Co. Inc., who is directing the program. Classes began June 20.

Expenditures To Total $106 Billion, 80 Per Cent Increase Over 1942

Combat plane production to be three and one-half times last year's output. Construction de-emphasized as preparatory phases reach substantial completion. Exports of most materials scheduled to advance

OVERALL war expenditures by the United States in 1943 are scheduled to total $106,000,000,000, or an 80 per cent increase over the $59,000,000,000 spent in 1942.

These figures cover the total program, including munitions, construction, and non-munitions such as pay, subsistence and other items. The figures are included in a report to President Roosevelt by Donald M. Nelson, War Production Board chairman.

Commenting on the report, Mr. Nelson said: "In the main, the productive achievement of the American war economy in 1942 met the requirements of our war strategy; and the prospects for 1943 are for a quantity and quality of production that will realize to the full the tremendous potential of American industry.

"We have met with some disappointments and have made some errors in achieving the results. The important point, in my judgment, is that an unprecedented and, on the whole, a balanced output was achieved."

Mr. Nelson pointed out that the 1942 expenditures represented three and one-half times the 1941 figure of $16,500,000,000 and almost 20 times the second-half 1940 total of $3,000,000,000.

Of the $106,000,000,000 total, the munitions and construction portion of the 1943 program amounts to $84,000,000,000, an 80 per cent increase over comparable 1942 output.

Projects Substantially Completed

Of this, in turn, the volume of construction projected, while still fairly large—more than $11,000,000,000—forms a much smaller proportion of the total than in 1942; 13 per cent as compared with 30 per cent—an obvious reflection of the fact that the preparatory phases of the war production program—the tooling up for munitions output and the construction of bases, barracks, hospitals, etc., for the training and maintenance of the armed forces—are already substantially completed.

The situation for munitions alone is quite different. Their programmed value for 1943, $72,300,000,000, represents an increase of nearly 125 per cent over output in 1942. And for significant and large categories of munitions the relative rise called for in 1943 over 1942 is much larger.

Thus, in combat planes the programmed value of 1943 output is 3.5 times that of actual output during the last year; in spare propellers, engines and parts, 2.7 times; in other plane equipment and maintenance, almost 4 times; in ground signal and related equipment, over 3 times; and in minor combat vessels, nearly 4 times.

NE STEELS GAIN

Increased use of the "lean" national emergency steels is clearly demonstrated by the production figures.

Output in May was 270,000 tons. In June last year, output was only 40,000 tons. In January, 1943, production was about 195,000 tons.

Reports from the field indicate consumers are well satisfied with these steels for many purposes and may stick with them after the "peace" is won.

On the basis of programs envisaged in December, 1942, the needs of military production during 1943 call for substantially greater quantities of almost all critical materials than in 1942. Direct military requirements for steel are up 31 per cent. Aluminum, mainly for airplane manufacture, and nitrogen, for explosive production, are up over 100 per cent. Phenol and toluene, also essential for production of explosives, are likewise up more than 100 per cent. Magnesium is up considerably more than 200 per cent.

An even larger increase, 450 per cent, is expected in the direct military use of ethyl alcohol, principally for the synthetic rubber program and for making smokeless powder. Copper, almost alone among the leading industrial materials, shows less than a 10 per cent increase from 1942 to 1943, reflecting the great difficulty of increasing supplies of that metal.

Exports also are scheduled to advance substantially for most materials, copper again constituting an important exception. Outstanding is a seven-fold expansion in magnesium shipments, principally for the United Kingdom's airplane and incendiary bomb programs.

With few exceptions, these increased requirements for materials for military use and for export during 1943 must be met through corresponding increases in new supply during the year, that is, from added domestic production and higher imports.

Unlike the situation which prevailed at the start of 1942, only limited quantities of most scarce materials can be rendered available by further reduction in the civilian economy. Nor is it possible, for most materials, to deplete stocks further without endangering war production.

Restrictions on use of most metals in effect at the beginning of 1943 were severe. Allotments for such uses as railroad equipment and maintenance, agriculture tools and machinery, and industrial repairs and maintenance are being increased above December estimates.

On the basis of programs and expectations as formulated in December, 1942, the balance between supply and requirements for most critical materials should apparently improve during 1943 as increased supplies become available.

Scarcity of vital materials will remain a critical limiting factor on war production during 1943. The tightness of steel, copper and aluminum, especially, necessitates prompt and decisive shifts if we are to avoid cut-backs in projected programs, attain balanced output, keep stocks at a level adequate to insure continued production.

Our war plants are, for the most part, well on the way to completion. The peak was reached in the fall of 1942 and by the end of 1943 construction will be down to almost the 1941 level. A relatively small part—about $500,000,000 worth—of the projects now planned will not be finished until 1944.

Construction Behind Schedule

Past experience, however, leads to doubt that the war industrial facilities, now under construction, will progress in exact accordance with present schedules. Indeed, it may be assumed that their completion will be delayed from two to three months, on the average. The main reason for probable delays and for the relatively late scheduled completion dates for a number of projects is the inability of the machinery industries, as now organized, to produce certain critical types of machinery and equipment as rapidly as the plants are completed. Bottlenecks exist among some machine tools (particularly the larger and more specialized types) and among certain criti-

cal types of production equipment.

Additional demands for machinery, particularly certain machine tools, may also be expected if radical changes are made in models of armaments, since such changes often require extensive retooling. Both British and German experience indicate that this demand for equipment is considerable and it would appear that there has not yet been sufficient allowance for it in our programs.

Any failure to reach 1943 objectives will be due to shortages of material and labor and to shortcomings in scheduling and organization of production, rather than to insufficiency of plant and equipment.

Concerning possible retarding effects on immediate war production caused by concern over the postwar economic future, the report suggested three lines of positive action to counteract such effects.

First and most obvious step is to obtain adequate data on the effect of war production developments upon the structure of the economy. Needed is reliable information on the distribution of new capacity and resources among various industries, regions, and firms of different sizes; this information should serve to reveal the extent to which additions to resources are of the type that constitute economic power in the immediate postwar future. So long as maximizing war production was the only overwhelming concern, we were naturally not greatly interested in costs in terms of effects upon the enduring structure of economy. But if the situation changes so that more attention may be devoted to the postwar future, reliable information should be available to reduce any controversial issues to conformity with firm data rather than with guesses and conjectures that necessarily permit bias and prejudice.

Secondly, such information would be needed immediately, if, as it seems reasonable to suggest, greater attention were to be paid henceforth in the procurement and other aspects of war production to the impact of war orders and war output upon the structure of the economy. The recent pressure for the awarding of a larger share of war contracts to smaller firms is a clear indication of the greater attention that should be paid to what might be called the "structural" aspects of war production costs. While the military production task ahead is still huge, there seems, nevertheless, to be more room in the immediate future than there was during 1942, for a more careful weighing of alternatives in placing contracts; and in seeing to it that the distortion of the peacetime structure of the economy be as small as feasible.

Finally, it is time to consider plans for the eventual postwar future, not so much in the sense of discussing sweeping alternatives that may never confront us, but in the sense of specific planning as to how the transition from the war to the peacetime economy is to be made.

Numerous questions arise when such specific planning is considered: How to proceed with the necessary reductions in the output of munitions; what disposition to make of the government inventories of peace-type products; what arrangements should be made for gradual cancellation of outstanding contracts; what policy is to be adopted for government-owned industrial facilities erected during war time; and a host of similar important policy decisions. The price of unpreparedness for war has been rather high; the costs of unpreparedness for orderly transition from war to peace may not be dramatic, but can be extremely high nevertheless.

POISON GAS: Steel cylinders filled with chemicals for making poison gas, ready for shipment at an eastern arsenal, back up the President's warning that this country is well prepared to retaliate in kind if the Axis resort to this type of warfare. NEA photo

First Quarter Output 19% of Year's Goal

Only 19 per cent of scheduled munitions production for 1943 was completed in the first three months of the year, leaving 81 per cent to be concentrated in the remaining three quarters, according to C. E. Wilson, vice chairman, WPB, who addressed 850 members and guests of the Economic Club of Detroit, June 11.

He added that schedules for 1944 call for a 24 per cent increase over 1943, and a monthly average well above the peak month of the current year, which will be in the last quarter.

He cautioned against interpreting reduction in certain ordnance schedules as indicating that the war production demand was tapering, pointing out that this cutback was mainly due to diminished demands from Russia for tanks. He said production of high-explosive and armor-piercing shot was scheduled to increase, the airplane tonnage this year will be three times the figure of 1942 and next year will be twice the weight produced this year.

In numbers, output this year is expected to reach 100,000, but the true measure of production is weight, not numbers, because of the steadily rising proportion of heavy bombers and cargo transports, and the declining percentage of light training planes, now down to about 25 per cent of the total.

Cargo ship production likewise is scheduled for tremendous boosts—from 1,000,000 deadweight tons in 1941 and 8,000,000 tons in 1942 to 9,000,000 tons in only six months of 1943, and 20,000,000 tons planned for the full year.

Mr. Wilson confirmed the fact to STEEL that E. C. Kanzler is now serving with a small staff as special assistant to Donald Nelson in Washington, concentrating on the problems of reconverting industry to peacetime production. He also indicated the steel supply picture now is much more favorable, particularly in respect to alloy types.

Unionists Win High WPB Posts; Congress Passes Antistrike Bill

Compromise Smith-Connally measure lacks balance. Wording of some sections ambiguous. Prohibits political campaign contributions by organized labor groups

ORGANIZED labor last week won a long fight for more representation in the policy making of the War Production Board and the War Manpower Commission when two of its representatives were appointed vice chairmen of the WPB and one a vice chairman of the WMC.

Clinton S. Golden, assistant to Philip Murray, president of the CIO and of the United Steelworkers of America, was made WPB vice chairman for manpower liaison; simultaneously, WMC Chairman Paul V. McNutt appointed Mr. Golden WMC vice chairman to serve as adviser on all labor relations aspects of the commission's program.

Joseph B. Keenan, former secretary of the Chicago Federation of Labor-AFL, was named WPB vice chairman for labor production.

Both Mr. Golden and Mr. Keenan will report directly to Charles E. Wilson, WPB executive vice chairman.

Elevation of the labor leaders climaxed a year-long campaign by the unions to obtain a louder voice in the direction of the war program.

It also followed closely the passage by Congress of the Smith-Connally antistrike bill, designed to prevent stoppages in war industries. Prompted largely by the open defiance of the government by John L. Lewis, president of the United Mine Workers, in permitting the coal miners to strike causing a loss of 11,000,000 tons of vitally needed fuel, the antistrike bill is a hastily assembled hodgepodge. It contains some good and some doubtful features.

The bill formally endows the President with the power to seize any war plant in which a strike occurs whether or not the employer shares any responsibility for the stoppage. A strike does not become illegal until the plant has been seized. Thus a strike cannot be made illegal merely on the ground that a union has struck against an order of the government; a government agency must be operating the plant.

Effect of this may be to punish an employer for conditions beyond his control. Actually, workers may strike to force the government to take over a plant.

Heart of the bill is contained in Section 6 (a). This makes it unlawful, when a plant has been seized, for a person "to coerce, instigate, induce, conspire with or encourage" any other person to strike. It also prohibits directing or guiding such an interruption and payment of strike, unemployment or other benefits to those participating in the stoppage.

However, the section continues: "No individual shall be deemed to have violated the provisions of this section by reason of his having ceased work or having refused to continue to work or to accept employment."

Under the ambiguous wording of the section, it would be possible to jail and fine, for example, a minister for approving a strike while the strikers themselves could go unpunished because they only "ceased to work."

Penalty for violators of the section is a fine of not more than $5000, a year's imprisonment, or both.

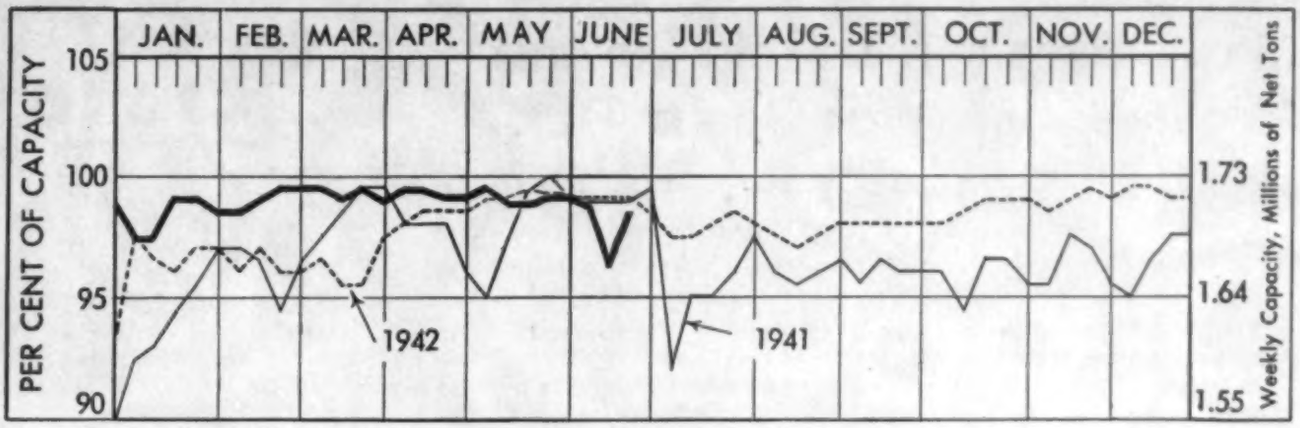
The final bill also contains a modified version of the 30-day cooling off period and a secret ballot under government auspices. Many observers consider this provision confusing in a bill which is designed to make all wartime strikes illegal.

One of the provisions most generally approved is that prohibiting labor unions from making contributions to political campaign funds. This stemmed from the half-million dollar "loan" by John L. Lewis' union to the party in power during the 1936 campaign.

Permit Pay Raises To Comply with State Law

Wage or salary increases made in compliance with a state minimum wage law or order may be made effective when issued by the War Labor Board or one of its agencies, even though prices or rates may be affected. The WLB said it had been informed by Fred M. Vinson, director of economic stabilization, that he would permit such increases when they had been approved by WLB.

SOLDIERS MINE COAL: Threatened with an acute power shortage through uncertainty of the United States coal supply, the Canadian government granted three month furloughs to soldiers who formerly were miners that they might return to their old jobs. Above, Private McDonald works in a Nova Scotia mine. NEA photo



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	....	....	....	....	....	....	....
1942	7,112	6,512	7,392	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150
PIG IRON PRODUCTION												
1943	5,194	4,766	5,314	5,035	5,178	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,531	4,766	4,784	4,721	4,860	4,707	5,014

Pig Iron Output Up

May production gains slightly over preceding month. Operations average 96.2 per cent

PIG iron production in May increased slightly, according to the American Iron and Steel Institute's monthly report.

Although bettering the showing of the preceding month, May production did not equal the record-breaking total reported for March when 5,314,201 tons were turned out.

Total output is reported at 5,177,728 tons, made up of 5,123,703 tons of pig iron and 54,025 tons of ferromanganese and spiegeleisen.

In April output totaled 5,035,178 net tons. May operations averaged 96.2 per cent. Operations for the year average 97.3 per cent.

For the first five months of this year output aggregates 25,503,858 tons.

Small Ore Producers Seek Price Relief

Prices on file with the Office of Price Administration, Basic Materials Division, show the larger ore producers such as Pickands Mather & Co., Cleveland-Cliffs Iron Co., and Butler Bros., are obtaining $4.45 as a base rate.

United States Steel Corp.'s Oliver Mining Co. gets $3.35 for ore from new mines and $4.12 from its older workings. Smaller companies have had prices on file as low as $4 but are submitting petitions for increases based on higher costs. Some relief has been granted.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended June 19	Change	Same Week 1942	Same Week 1941
Pittsburgh	97.5	+7.5	95.5	99
Chicago	97	None	103.5	102
Eastern Pa.	94	—1	96	97
Youngstown	97	None	95	98
Wheeling	90	+4	81.5	88
Cleveland	94.5	—0.5	92	95
Buffalo	90.5	None	90.5	90.5
Birmingham	100	+5	95	95
New England	95	None	100	94
Cincinnati	93	+5	95	95
St. Louis	95	+2	95.5	98
Detroit	87	+4	95	94
Average	98.5	+2	*99	*99

*Computed on bases of steelmaking capacity as of these dates.

Great Lakes Stack Sets New World Record in May

A new world's record for monthly production of pig iron by a single stack was set in May when "B" stack of Great Lakes Steel Corp., Detroit, made 49,705 net tons, a daily average of 1603 tons. This was 30 per cent above the stack's officially rated capacity and 1200 tons greater than the prior record of 48,505 tons set in March.

May tonnage of the Great Lakes stack was more than 6000 tons over its best previous output, 43,478 tons, in March, 1942.

This is the seventh record set since January, 1942, when the long-standing mark of 41,701 tons set by Gary No. 10 stack of Carnegie-Illinois Steel Corp. in July, 1931, was broken by Carrie No. 3 stack of Carnegie-Illinois Steel Corp. at Rankin, Pa.

Ingot Rate 98½%

Renewed coke supply restores high production. Increases in many districts

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced 2 points to 98½ per cent of capacity, regaining the recession of the prior week as coke supply was renewed. The Pittsburgh district regained 7½ points of the 8½ points lost the week before and small increases at other points balanced the former decline. Six districts advanced, two declined and four were unchanged. A year ago and two years ago operations were at 99 per cent, based on capacity as of those dates.

Youngstown Sheet & Tube Co. has blown out a stack at Hubbard, O., for relining, serving its customers from its Campbell, O., furnaces.

Five Months Ship Output Nearly Double All 1942

Maritime Commission announces that during May American shipyards delivered into service 175 new ships, totaling approximately 1,782,000 deadweight tons. This brings the total to date in 1943 to 711 ships, only 35 units less than total production for all of 1942.

Two large ore carriers were completed in May by Great Lakes Engineering Works, River Rouge, Mich. They are 621 feet long with capacity of 14,500 tons of iron ore. Both have been placed in the ore trade at once.

Management Men Told Slowest Producer Sets War Goods' Pace

Production records show American industry has made excellent use of "know how" but all companies not operating on same level of efficiency. . . Batt re-elected chairman of association

THE WHOLE job of war production is geared to the speed of the slowest producer, Alvin E. Dodd, president, American Management Association, said at a meeting of the organization in Hotel Pennsylvania, New York, last week.

He declared that while production records show American companies have made excellent use of their "management know how" all concerns were not operating on the same level of efficiency.

"It is this slow producer who needs our help for if he is a maker of one part of a weapon, that weapon only gets to the firing line with the speed he operates.

"On the other hand, from the standpoint of sheer production, slow producers or not, we have reached the highest point of efficiency in our history. At the business of producing the materials of war we are no longer tyros. We know now that American industry is equal to supplying the most insatiable customer it has ever known. Without being complacent, we know we can continue to deliver."

Dodd Re-elected President

William L. Batt, vice chairman of the War Production Board and president, SKF Industries Inc., Philadelphia, was re-elected chairman of the association and Mr. Dodd was re-named president.

Other officers include Thomas Roy James, president, American Type Founders Inc., chairman of the executive committee; Harold V. Coes, Ford, Bacon & Davis Inc., finance committee chairman; James L. Madden, Metropolitan Life Insurance Co., treasurer, and Henry J. Howlett, secretary.

New vice presidents elected by the association and their divisions are: Henry E. Niles, Baltimore Life Insurance Co., office management; L. A. Appley, Vick Chemical Co., personnel; Erwin H. Schell, Massachusetts Institute of Technology, production; Don G. Mitchell, Sylvania Electric Products Inc., marketing; H. C. Perry, Heywood-Wakefield Co., finance and accounts; William F. Lund, United States Rubber Co., insurance, and Joseph Givner, Real Silk Hosiery Mills Inc., packaging.

New directors are W. E. Tarr, Studebaker Corp., South Bend, Ind.; L. S. Morrow, *Factory Management and Maintenance*, New York; Leonard J. Raymond, Dickie-Raymond Inc.; J. H. Macleed, Hinde & Dauch Paper Co., Sandusky, O.; Reginald Fleming, Marsh & McLennan Inc.; Charles R. Hook Jr., Rustless Iron & Steel Corp., Baltimore; Lee H. Hill, Allis-Chalmers Mfg. Co., Milwaukee; George H. Williamson, Williamson Candy Co., Brooklyn, N. Y.; Charles P. McCormick, McCormick & Co., and Roscoe Seybold, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"To Each Other"—New U. S. Steel Film Previewed by Industrialists

NOTABLE group of business and industrial leaders attended, June 16, the New York preview of "To Each Other," a motion picture depicting the wartime expansion program of the United States Steel Corp., as narrated by Walter Brennan, 3-time winner of the annual award of the Motion Picture Academy of Arts and Sciences for outstanding dramatic performances.

Held at the Waldorf Astoria, following a luncheon in the main ball room, the preview was witnessed by 800.

Irving S. Olds, chairman, United States Steel Corp., in brief introductory remarks, said the achievements portrayed in the picture were typical of the "swell job of production" being done by American industry under wartime pressure.

The film, in 35 minutes, gives a resume of additions to existing plants of the steel corporation, conversion of old plants to war production and the progress being made in construction of complete new plants in all parts of the country. Manufacturing scenes illustrate the manufacture of armor plate, ship plate, bomb casings, shell forgings, pipe, tubing, wire rope and other wire products.

War Production Board Revises Official CMP Class B List

REVISED official CMP Class B Product List, including a Class A Civilian Type End Product List, has been issued by the War Production Board. The list supersedes the earlier Class B Product List published Dec. 21, 1942.

In some instances, with respect to specific products within each classification, definitions and interpretations have been listed. These are intended to clarify the scope of product groups to aid manufacturers in classifying their products.

Regional offices of WPB have been provided with definitive lists in order that manufacturers who have questions as to whether or not their product is included in one of the broad categories in the Class B List may refer their problem to the regional office.

Civilian Type End Products are those for the manufacture of which procuring claimant agencies hold contracts with prime consumers, as defined in CMP, and for which the agencies may elect to allot controlled materials directly. In such a case, the claimant agency will notify the prime consumer to submit applications directly to it on form CMP-4A for controlled materials required to cover the agency's authorized production schedules. In the absence of such notification from a procuring claimant agency, prime consumers manufacturing the specified products must apply for controlled materials and authorized production schedules to WPB on form CMP-4B.

Farm Machinery Production Quotas Are Established

Producers of farm machinery and equipment are now permitted by the War Production Board to manufacture any item for domestic sale up to the percentage indicated for that item in schedule A of a new order, L-257. These quota percentages are expressed in terms of total net weight of the item manufactured by him during either 1940 or 1941, whichever was higher.

Effective July 1, the new order cuts short the life of its predecessor, L-170, by three months; however, it permits uncompleted quotas under L-170 to be produced in addition to the new quotas.

The percentages for production quotas of specific items named in schedule A attached to L-257 are worked out on the basis of the advance over-all authorization of 900,000 tons of carbon steel made to the industry for the period July 1, 1943, to June 30, 1944, as recently announced.

The new order brackets a large number of items in schedule A to allow producers maximum flexibility on planning their production. It also provides that production of any item of farm machinery and equipment and repair parts must be in accordance with production schedules approved by WPB. Restrictions have been removed on manufacture of repair parts for domestic sale, except to extent that schedules for production and delivery of such repair parts have approval of WPB.

A supplementary order, L-257-a, covering export of farm machinery and equipment, also has been issued. The two orders together establish following controls over exports: (1) Set up net weight quotas for each country or group of countries served by Lend-Lease and Board of Economic Warfare. Exports for Canada, except those of repair parts and attachments, continue to be on a unit basis; (2) require producers to schedule production and shipment in accordance with schedules approved by WPB; (3) shipments to two specified groups of countries are subject to special approval by WPB.

Ruling Aids Warehouses in Replenishing Steel Stocks

Steel warehouses distributing merchant trade products can now replace on an equal basis stocks sold on any type of authorized controlled material order. This is provided in order M-21-b-2 and the action was taken because warehouses selling material on orders bearing claimant agency allotment numbers had an advantage in replacing stocks over warehouses whose trade was largely in MRO and other types of authorized controlled material orders.

WPB Requires Tentative Booking of Steel Orders

A steel producer who is unable to accept an order for delivery in a particular month because the schedule for that month is full is required to book the order tentatively as early as possible in the succeeding or second month following.

This procedure is outlined in direction No. 18 to CMP regulation No. 1.

Previously, the regulation required a producer to refuse an order for a particular month after his schedule for that month had been filled, even though there was room on the schedule for the first or second month thereafter. In a number of cases, by the time the order had again been placed for a later month, the producer's schedules were again filled.

Bolt and Nut Price Order Revised by OPA

Types of bolts, nuts, screws and rivets covered by maximum price regulation No. 147 have been redefined by the Office of Price Administration. The redefining draws a more specific line of demarkation between special machined-from-bar items covered by the regulation from other screw machine products for which maximum prices are established in regulation No. 136.

Additional changes in price regulation No. 147 follow: (1) Provides that ceilings for machined-from-bar special bolts, nuts, screws and rivets may be computed on basis of costs as of March 31, 1942, plus customary mark-up on that date; (2) requires manufacturers to recompute maximum prices of all special products, filing pricing data with OPA whenever a new higher price for a special product is charged.

Cancellation of Certain Ratings Ordered by WPB

Preference ratings applied to orders for specified items, which were not filled by June 4 must be cancelled if they are not in conformity with restrictions imposed on that date under priorities regulation No. 3, War Production Board announces. The groups of items are specified in lists A, B, and C of the regulation. The lists specify products to which various restrictions are applicable.

Replacement Orders Given Delivery Preference

Replacement orders of copper and steel, rejected because of non-conformity to specifications, take precedence over all other orders, War Production Board rules. Replacement orders of aluminum must be filled in preference to all other orders not in actual production on day replacement order is received.

Secondary Aluminum Ingot Price Reduced One Cent

Maximum base price of secondary aluminum ingot has been reduced one cent per pound by Office of Price Administration to promote a continued normal flow of aluminum scrap to smelters. The reduction brings price to 14.00c a pound.

WINDOWS of WASHINGTON

Big Joke?

NEWSPAPER gossip to the effect John L. Lewis is going to take over American Federation of Labor control and kick out Bill Green when he returns to AFL with his United Mine Workers in August or September is regarded as a big joke by old-time labor leaders affiliated with the AFL. No labor leaders, of course, will interfere with Mr. Lewis' authority over his UMW. But the control of the AFL is another matter. The AFL is controlled by its executive council, and sitting on this council are a number of labor leaders who are just as tough and smart as Lewis even though they are not so highly publicized. Recalling past experience, one of these old-timers could remember only three motions made by "John" that were adopted by the council. It further is pointed out that Bill Green has no power of control and that he is merely a "front" man on a salary basis, and that his AFL organization is a small one. He has no power to drive out "racketeers," as has been demanded by Westbrook Pegler on so many occasions. Incidentally, one of these old-timers in the AFL estimates that some 85 per cent of the AFL unions are "good" unions and that some 15 per cent are of the "racketeering" type.

Postwar Prediction

One of the country's most highly regarded students of organized labor makes this prediction: When we run into widespread unemployment over a brief period in converting our war industries back to peacetime production the American Federation of Labor unions will prove co-operative. The AFL unions in most cases have had a long history; they understand depressions and have been known to take voluntary cuts in pay. He believes CIO unions will become impatient and complicate an already difficult situation by making all sorts of demands.

Alaska Beckons

Experience during the war is serving to throw Alaska—in fact a vast Northwestern area—into focus for intensive postwar development. The war has indicated that we face grave dangers to our national security if we fail to increase our population in that area to a much larger number than the 80,000 people who lived there prior to the war, and of whom 30,000 are native Indians and Eskimos. Now that Canada has completed a series of airports that link Fairbanks, Alaska, and Edmonton, Alberta, and now that the first Alaskan highway is in use, other roads are being built in Alaska. Alaska is rich in resources of timber, coal, fur, fish, game, gold, silver, radium, lead, copper, oil. Vegetables grow well and grain is grown as far north as Dawson. There is a vast amount of undeveloped water power.

A group of officials working under the auspices of the permanent Canadian-American Economic Committee has undertaken a study to determine the most desirable postwar use of the Great Northwest, including North British Columbia, the Yukon and Alaska. President Roosevelt has authorized a special study of the Alaskan highway by the National Parks Service. The postwar period will open many opportunities in the Northwest.

PUSH SPONGE IRON

The Bureau of Mines has made some progress in "sponge iron" research but much ground remains to be covered. Most progress has been made at the Boulder City, Nev., pilot plant where several hundred tons of beneficiated product were obtained by removing 97 to 98 per cent of the oxygen content of the iron ore treated. The problem there now is how to control the product so as to provide material for charge into different types of melting units, as blast furnaces, open-hearth furnaces and electric furnaces. The beneficiated product was high in sulphur and phosphorus.

At its Binghamton, N. Y., and Canton, O., pilot plants, where the heating units are abandoned brick kilns, good results were obtained in producing a reduced ore suitable evidently for charging into electric furnaces. At the Longview, Tex., pilot plant results were somewhat less desirable, trouble being encountered in reducing the oxygen content sufficiently. The most important pilot plant, that at Laramie, Wyo., has been practically completed and soon will be placed in operation.

"Slick" Paper Problem

A paper difficulty now threatening publishers of books and periodicals also applies to all manufacturers who issue catalogs printed on "slick" paper. This paper cannot be made without using starch—and starch manufacturers are faced with early shutdowns.

"Court of Appeals"

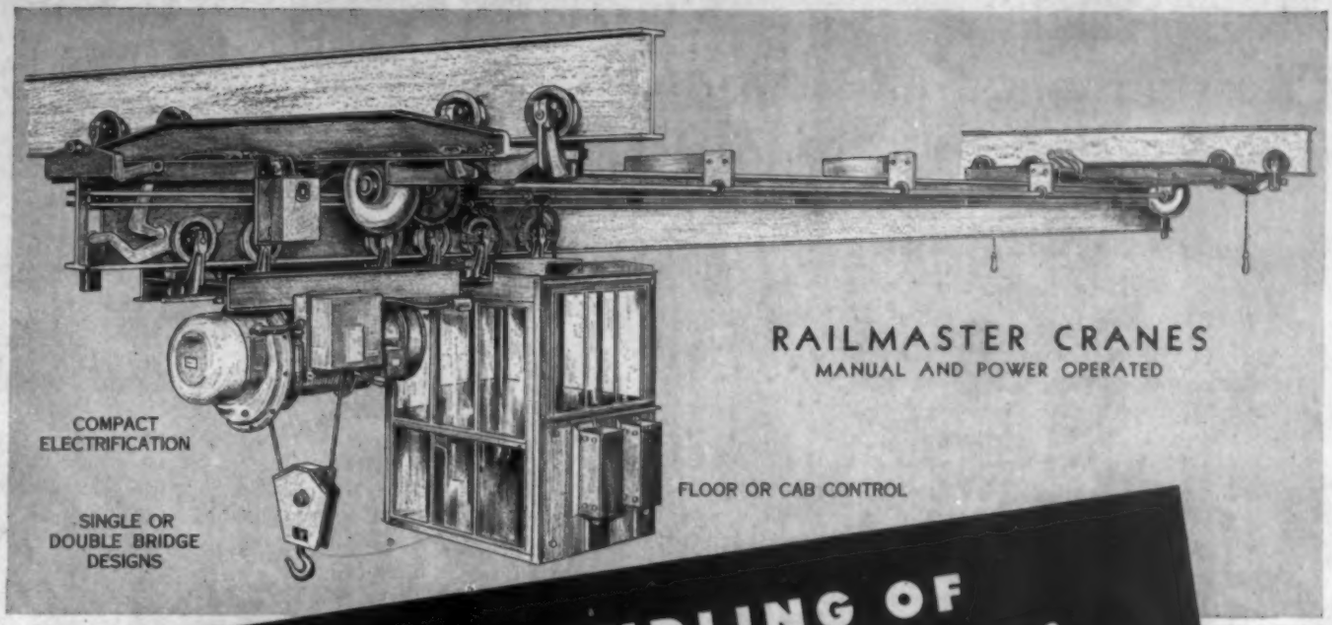
Press Division of the Office of Censorship, Room 500, Apex Building, Sixth and Pennsylvania avenue, N.W., Washington, which has the final voice in ruling on what may be published under the wartime censorship code, has got well past its organizing period and functions rapidly and smoothly in passing on editorial and advertising copy that is submitted for review. It has on call many technical experts in the Office of Scientific Research and Development and elsewhere to whom it refers, when necessary, material that cuts across the code. The Press Division has succeeded in liberalizing censorship to a marked degree and in numerous cases has been able to persuade one or another of the armed services to reverse their positions and approve for publication material to which they previously had objected. Publishers and advertisers to an increasing extent are using the Press Division as a "court of appeals" when they run into censorship trouble with any of the government agencies—and in most cases the results are favorable.

Hit 'em with Data

Now in formulation is an easement in the censorship ban on figures representing our production of various military items. In the early days when we were mobilizing for all-out war production, and when output was woefully inadequate, this ban had considerable justification. Feeling is growing that production now has reached so huge a volume that definite figures should be revealed, not only to encourage our own people, but to discourage the enemy. The feeling is that our enemies will get more jittery if they are informed about the weight of the ammunition that is to be unloaded upon them. Some key men still believe in a policy of giving out no information whatever since it might be of value to the Axis.

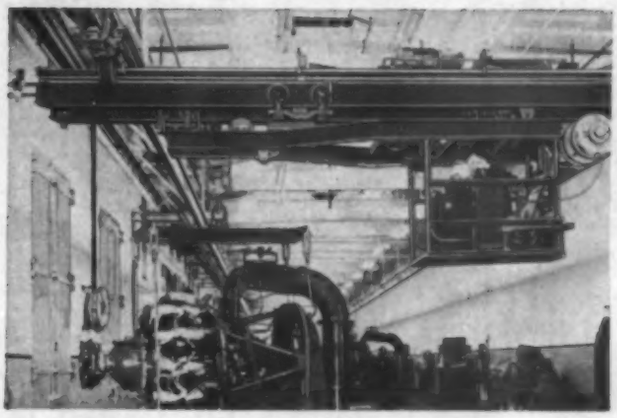
Stagger Vacations

Office of Defense Transportation advocates staggering vacations over the full 12-month period the remainder of the war. It finds that about 25 per cent of present passenger travel comes under the head of "pleasure" traveling. This does not include vacation travel. Incidentally, the growing number of complaints that ODT is receiving from the traveling public seems to indicate that the wave of "understanding" is coming to an end and that the public is getting more cranky over the conditions surrounding railroad passenger travel.



FLEXIBLE HANDLING OF *Massive Production*

B-28 Bomber Makes Maiden Flight on RailMaster Crane.



Spotting motors with telescoping crane.

MASSIVE loads set up no problem when American MonoRail RailMaster Cranes are on the job. They are not limited to bridging a single span but, with their special interlocking and twin bridge designs, they can cover any area with any type of handling equipment.

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Views Change on Construction of Projects as Pensacola Dam Fails

Witness tells House committee "full" reservoirs needed to generate power, "empty" ones to store water. . . Relationship of two activities appears less close than originally thought

AMONG big developments after the war will be the execution over a period of years of a program to develop our rivers and streams. This program includes provisions for flood control, power generation and prevention of soil erosion.

Many millions of dollars already have been appropriated by Congress for this purpose, particularly so that employment may be furnished on a sizable scale on projects in the immediate postwar period.

A good many manufacturers who expect to take a part in the execution of this program will be interested to learn about a change that is taking place in the thinking about flood control and power generation. Hitherto the two activities have been associated. The change in thinking was reflected at last week's hearings by the House Flood Control Committee when one witness pointed out that "full" reservoirs are needed to generate power whereas "empty" reservoirs are needed for storing flood water.

This point was brought out during an attempt to ascertain why the new Pensacola dam in Oklahoma failed to halt the fury of the two disastrous floods which occurred in quick succession in the Grand River valley in May of this year.

Plan Multiple Dam System

The committee originally took the view of the Army Engineer Corps, and pushed it through Congress, that the Pensacola dam, 755 feet above sea level at the top of the gates, should be operated at a water level of 735 feet, thus holding the remaining 20 feet in reserve to absorb flood waters. It was brought out at last week's hearings that the Pensacola dam was intended to be one of a multiple system of three dams, with the others to be located at Markham's Ferry and Ft. Gibson.

Work was started on the Pensacola dam after the War Production Board had approved on its essentiality for the war and it was completed under license of the Federal Power Commission and since has been operated by the Federal Works Agency. The license was granted only after the Army Engineer Corps, on protest, consented to permit it to be operated with a water level of 745 feet. The Federal Power Commission, in taking its position, considered the project only in the light of its importance as an additional source of power for the war effort and it insisted that the dam must be operated at as close to capacity as it considered safe and practical.

The Federal Works Agency pointed out that its gross income from the sale of power now stands at about $1,700,000 annually whereas operating at a 735-foot level would bring in no more than $800,000, which would mean something less than half as much power.

Simplifications Conserving Metal

Important savings also made in manpower; Major programs to be in effect by yearend

ALL possible simplifications which make a major contribution to the war program will have been substantially completed by the end of 1943, according to Howard Coonley, director, Simplification Branch, War Production Board.

So far tremendous savings in critical materials have been effected by WPB orders covering simplification and curtailment of consumer and industrial items. The following savings are typical: 600,000 tons of steel, 17,000 tons of copper, 35,000 pounds of solder and 8000 pounds of tungstetn.

Equally significant are the less tangible results in savings of manpower hours, reduction of inventory and increased production. By eliminating 75 per cent of the variety in manufacturers' lines, not only was production increased substantially in bottleneck industries, but also an estimated 15 million man-hours were released for work on more vital war items.

The 1943 simplification program will save thousands of carloads of transportation space, millions of square feet of factory warehouse space, and will add to the country's stockpile of raw materials by reducing inventory requirements some 25 per cent, and will augment the total productive capacity of the nation's machines up to 20 per cent, according to Mr. Coonley.

In the matter of steel alone, it is predicted that the 1943 simplification program will accomplish the equivalent of building new furnaces to produce some five million tons of steel.

The year before the war came to America, the goods which went into the home in the form of clothing, housefurnishings and equipment, food and transportation items consumed very sizable quantities of metal resources of the coun-

POWER AND FLOOD CONTROL: Aerial view of the Grand River dam at Vanita, Okla., constructed by the federal government at a cost of $22,750,000. NEA photo

try. Specifically, in proportion to total year's output, they used: Aluminum, 22 per cent; copper, 19 per cent; brass, 19 per cent; zinc, 20 per cent; tin, 23 per cent; steel, 30 per cent; nickel, 16 per cent and chromium, 15 per cent.

Prohibition of manufacture of certain articles, or limiting the amount of critical materials used in producing them, and simplification are conserving domestic supplies for essential purposes.

Simplification of battery manufacture, for instance, has saved almost 16 million pounds of secondary lead, over 17 million pounds of primary lead and over a million and a quarter pounds of secondary antimony. Reduction of types of auto chains from 12 to 3 and of sizes from 22 to 4 has saved 21,000 tons of carbon steel and small quantities of molybdenum, copper, zinc and tin.

Seek More Steel

WPB pressing industry for additional million tons output in third quarter

UNCONFIRMED story is going the rounds in Washington that the armed services and other agencies are not satisfied with the steel allocation made them recently by the War Production Board for third quarter, and they are said to be asking allocation of another million tons of steel.

This million tons is for carbon and alloy steel ingots, and just how WPB will be able to give the services this additional million tons has not yet been worked out.

It is reported, however, that among other things WPB hopes under the steel expansion program to get seven new open-hearth furnaces in operation in time for this third quarter production. It is possible also under the CMP plan that some of the allocations proposed for the third quarter will be changed and it is felt definitely that the services in some way or other will get this million tons additional which they request.

The reported WPB program includes:

1. Getting new projects into production ahead of schedule. Specifically this includes seven new projects confined to open hearths and blast furnaces.

2. Converting some of the former alloy steel facilities to carbon steel production.

3. More efficient distribution of excessive inventories of steel.

4. A drive to induce management to get more production for existing facilities.

Exhibit Provides Metal Industries Postwar Paper Competition Preview

ANYONE whose livelihood depends upon the production and sale of metals and metal products must, despite the heat and humidity that currently pervade the capital city, feel a chill when examining an exhibition to be found at Sixth street and Independence avenue, S. W.

There, in the Fisheries building, the Pulp and Paper Division of the War Production Board has assembled an impressive collection of paper and paper products now in use as successful substitutes for metals and metal products.

Paper, it becomes apparent in this exhibit, is going to be an active competitor of the metals and it is clear that the metals will have a difficult time in the postwar era in regaining some of their former uses. The pulp and paper industry has exercised great ingenuity in developing treatments by which paper may be able to satisfy a wide range of requirements. Laminated, and impregnated with various plastics, it becomes waterproof, gas proof and flame proof, and takes on such physical characteristics as high tensile strength—up to 16,000 pounds per square inch, elasticity, corrosion resistance and so on.

One group of products in the exhibit embraces angles, channels, sheets, plates, bars, twine, pipe and other sections. These are present in a wide range of sizes and in a variety of physicals suitable for different types of applications. As an example, one particular laminated impregnated paper board is covered with aluminum foil on both sides. Other items in the exhibit were manufactured from these materials or were produced by molding or pressing. Some of the products shown compare unfavorably in appearance with their metal predecessors. On the other hand the majority look good and should have no difficulty in winning consumer acceptance. Quite a few of the items shown are for military use. Most, however, fall into the category of civilian goods and undoubtedly they will continue to be made and offered on the market after the war.

The story is best revealed by a list of the products shown, as follows:

Shoe shank and arch support;
Dust pans;
Binders and rings for loose-leaf notebooks;
Alarm clock case;
Shell grommets;
Rope, twine and flat woven cable now widely used instead of steel wire and strapping in packaging;
Instrument cases;
Phonograph base;
Screen cloth;
Electric insulator box;
Dust cover for Packard motor;
Chick brooder;
Sanitary poultry feeder;
Automobile radio speaker housing;
Air transport food trays and food tray covers;
Textile spools;
Ice cream freezer cans;
Egg crates;
Desk trays;
Hot air ducts for domestic heating systems;
Pans for baking pies and cakes;
Automobile engine oil filter cartridges;
Gasoline, lubricating oil, tobacco, food, drug, paint and many other containers, large and small, and of many different designs;
Kitchen garbage dispenser;
Conduit of all sizes;
Reflectors for electric lights;
Towel holders;
Bushel basket;
Full-size ash and garbage cans;
Barrels and drums;
"Stop" and other traffic signs;
Gaskets and packing;
Pails and buckets;
Weatherproof box board;
Two types of box springs;
Handles for knives, machetes and other tools;
Protector for magnet of radio loud speaker;
Flashlight cases;
Clock facings and gear backs;
Filters, replacing brass filters;
File indicators;
"Wire" paper clips, stamped out of stiff paper board.

The exhibit is not intended to be a complete one. It is sufficiently representative, however, to indicate a source of competition that is of considerable concern from a metals point of view.

Recommends Use of Hot Finished Steel Tubing

Substitution of hot-finished for cold-drawn seamless steel tubing is recommended by the Seamless Steel Tube Institute as a means of meeting expanding war demands. Recommendation covers the larger sizes with heavier walls.

Uses for which hot-finished can be substituted for cold-drawn tubing include those in which the tubing is machined or in which appearance may be temporarily sacrificed.

While facilities of tube mills have been substantially increased, output is still short of demand. The substitution plan recommendation will ease this situation through the elimination of the time lost in annealing and heat treating.

Order Against Wire Rope Trade Withdrawn by FTC

The Wire Rope and Strand Manufacturers' Association Inc. received a complete dismissal by the Federal Trade Commission recently of an order to cease and desist previously entered by the commission on Dec. 8, 1942.

PRIORITIES-ALLOCATIONS-PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

INCREASED FLEXIBILITY in priority rating system has been provided by restoration of the AA-2 bracket between the AA-1 and AA-2X bands. AA-1 bracket is reserved for pressing military production and for certain other essential needs. WPB officials say that requests for up-rating of programs will be reduced to a minimum and point out that under the Controlled Materials Plan only as much material is allotted as is available at the mills. A manufacturer obtaining an allotment number is assured delivery of copper, steel and aluminum, regardless of preference ratings, provided his orders are placed with mills within the time limits specified by CMP regulations.

NO DOWN-RATING of maintenance, repair and operating supply orders is required, WPB says, if such orders were placed prior to May 16, where an industry was reclassified to a lower rating by the amendment of CMP regulation No. 5 on May 14. The regulation assigns a blanket preference rating of AA-1 to MRO orders for activities listed on Schedule I; AA-2 to those listed on Schedule II; and AA-5 rating to any business not listed. A business previously listed on Schedule I and shifted by the May 14 amendment to Schedule II must use the AA-2 rating, and if eliminated from either schedule, must use the AA-5 rating on orders placed after May 16.

RERATING: A preference rating assigned with an advance allotment of controlled materials used on orders placed prior to May 16 does not have to be changed even though a rating assigned with the third quarter allotment may be lower. Down-rating in such cases is not compulsory. Generally, when a preference rating assigned for the purchase of certain materials has been changed, uncompleted orders are rerated accordingly, effective the date the rating was changed.

ALLOTMENT NUMBERS: Manufacturers of Class A and Class B products must continue to identify all rated orders for production materials with allotment number assigned to the related production schedule under CMP procedure, even though allotment numbers on rated orders placed after June 30 will have no up-rating effect.

STEEL STITCHING WIRE used by printers and publishers for purposes defined in order L-291 is an operating supply which comes under provisions of CMP regulation No. 5. This holds true whether or not the user of the wire has customarily carried it as an operating supply, according to normal accounting procedure.

WATER WELL DRILLERS may apply for allotments of controlled materials on form CMP-4B in amounts necessary to carry on their business. The provision limits the definition of water-well drilling in this case to the drilling and casing of water wells, including the laying of pipe underground to bring the water to the surface and the laying of surface pipe for pump connections.

ALLOY STEEL producers have been notified that forms WPB-2933 and WPB-2934 are now to be filed in place of the form previously designated PD-391. The new forms must be used for filing August melting schedules and for supplementary schedules thereafter.

STAINLESS STEEL producers may now set up on their melt schedules items to be melted for inventory. This material would be held by the mill in semi-finished form and processed to fill orders of 2000 lb. or less having CMP allotment numbers. Producers should submit to the Alloy Steel Branch, Steel Division, WPB, a list of present finished and semi-finished inventory. The following should be indicated with respect to each item: (1) AISI type number; (2) quantity of each size and shape; (3) whether the item is workable, slow-moving, or one for which there is no apparent demand; (4) date of melt and heat number; (5) Complete chemistry if the item is off analysis from the intended AISI type number. The last two need not be reported on finished inventory.

STEEL FOUNDRIES which desire a load directive permitting them to reserve a certain percentage of their monthly productive capacity for emergency MRO supplies under CMP should write the Steel Division, referring to CMPL-286. This action was taken because many foundries are experiencing difficulty in scheduling emergency MRO orders to meet industrial and service requirements.

INDEX OF ORDER REVISIONS

Subject	Designation
Aluminum Rivets	CMP No. 1
Automotive Truck Bodies	L-253
Bills of Materials	CMP No. 1
Guards, Housings on Drives	L-193
MRO Supplies	CMP No. 5A
Machine Tools	E-6
Steel Cases	L-250
Steel Order Bookings	CMP No. 1
Steel Over-rollings	CMP No. 1
Suppliers	L-63
Price Regulations	
Ferrochromium, Chromium	No. 407
Ferrosilicon, Silicon	No. 405
Forgings	No. 351

CMP REGULATIONS

BILLS OF MATERIALS: Request for Complete Bills of Materials must, in all cases, originate with a Claimant Agency. WPB rules that a consumer must not request a Complete Bill of Materials from his supplier unless he, in turn, has been requested to furnish his customer with one. Applications for allotments must not include controlled material requirements for manufacture of Class B components, even though a Complete Bill of Materials has been requested. (CMP Reg. No. 1)

ALUMINUM RIVETS: Inventory restrictions of CMP regulation No. 2 shall not apply during the balance of this year, WPB rules, to the acceptance of deliveries of aluminum rivets acquired for use in the production of aircraft or aircraft components. (CMP Reg. No. 2)

MRO SUPPLIES: Preference ratings assigned to governmental and institutional activities for MRO have been changed to the following: AA-1 for activities listed on Schedule I; AA-2 for Schedule II; and AA-5 for activities not listed in either schedule. CMP 5A ratings and certification can not be used without WPB authorization. (CMP Reg. 5A)

STEEL ORDER BOOKINGS: A steel producer who is unable to accept an order for delivery in a particular month because his schedule for that month is full must book the order tentatively as early as possible in succeeding or second month following. Upon notification of month for which the order has been tentatively accepted, the customer furnishes producer with written confirmation within seven days. (CMP Reg. No. 1)

STEEL OVER-ROLLINGS: Steel producers are now permitted to replace shipments from mill stocks of over-rollings within 60 days from date of shipment. Title to the stock must not have been transferred to a steel consumer or to a warehouse, and quantity of steel maintained must not exceed average inventory of the product between Jan. 1 and May 1, 1943. These provisions do not apply to producer-owned stocks of steel products held on consignment by a distributor as these stocks are subject to CMP regulation No. 4 and general preference orders M-21-b-1 and M-21-b-2. (CMP Reg. No. 1)

L ORDERS

GUARDS OR HOUSINGS ON DRIVES: Steel may be used now in manufacture of guards or housings on mechanical power transmission drives. (L-193)

STEEL CASES OR CABINETS: Order L-250 prohibits use of steel cases or cabinets for various kinds of electric controllers, except for use in an atmosphere which is corrosive or which contains metal particles, dust or fumes or for use out of doors without other protection. Cases of the general purpose or semi-dust types do not come within exemptions to the prohibition, regardless of use to which purchaser alleges he wishes to put them. (L-250)

AUTOMOTIVE TRUCK BODIES: Sheet or Strip Steel in idle or excess inventories may be used for production of certain parts of automotive truck bodies, provided: the metal was in inventory on June 10, or was reported to Steel Recovery Corp., Pittsburgh. The metal also may be sheet or strip mill rejects, seconds, or wasters. The metal may be used only to cover (not to constitute) doors and frames exclusive of platforms and roofs. Use of iron and steel is limited in repairing or altering bodies of automotive trucks and trailers to an amount of new steel not exceeding 30 per cent of that used in the original body. (L-253)

E ORDERS

MACHINE TOOLS: Producers of wrenches, pliers, screwdrivers and other mechanics' hand service tools must set aside from 20 to 25 per cent of monthly output for commercial distributors. This allocation is contingent upon the manufacturer having on hand that proportion of orders based upon PD-1X (WPB-547) applications for priority assistance. If proportion is smaller, the additional production will be delivered to other buyers, predominately military. On the other hand, distributors will receive additional tools if orders other than PD-1X orders are less than 75 per cent of month's output. AA-4 rating is required after June 14 for orders placed on hand tool manufacturers. Orders in excess of specified amounts may be placed only upon WPB authorization. Application for authorization is made on WPB-1319 (formerly PD-556). (E-6)

PRICE REGULATIONS

FERROSILICON AND SILICON: Specific prices have been established, effective July 1, which in general maintain levels prevailing between Oct. 1 and Oct. 15, 1941. Regulation also incorporates new simplified zone system for pricing ferrosilicon and silicon metal. Details are given on page 142. (No. 405)

FERROCHROMIUM AND CHROMIUM: Specific dollars-and-cents maximum prices have been established for ferrochromium and chromium, effective July 1. Prices are established for all existing types and grades of the materials sold in the Eastern zone, and premiums are provided which may be added on sales in Central and Western zones. Details of the order are published on page 142. (No. 407)

FERROUS FORGINGS: OPA has ruled that ferrous forgings, whether made from materials supplied by the producer or in part or entirely by his customer, are subject to provisions of price regulation No. 351. Pole line hardware and construction line specialties, which include such articles as anchor rods, guy fittings and steel crossarm pins, are added to items excluded from coverage of the regulation. Bolts, nuts, screws and rivets as defined in regulation No. 147 are also excluded. (No. 351)

PD and UF Forms Renumbered in "WPB" Series

STANDARDIZATION of War Production Board data requests into one series only, "WPB," was started last month as reported in the June 14 issue of STEEL. All "PD" and "UF" forms and letters will be canceled as such, and will be reissued in the "WPB" series, as will also some of the "CMP" forms and letters.

"WPBI" will be prefix for all nondata request forms while authorization and allocation forms will bear "GA" prefix.

As forms and letters numbers are changed to the "WPB" series, they will indicate the former series number. Forms will carry both numbers for four months and those with the old number only may be used until the expiration date.

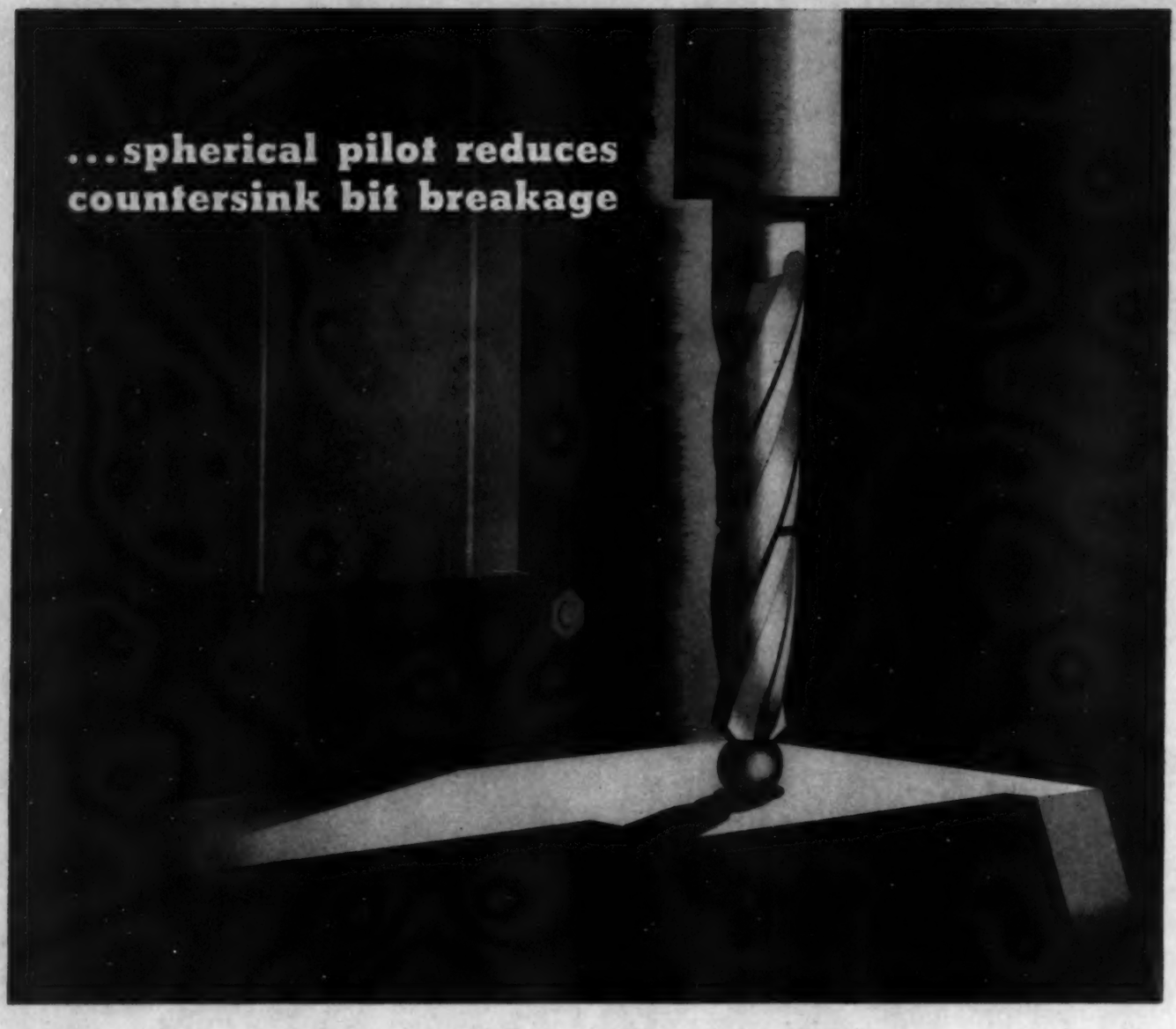
For purposes of control, all War Production Board forms have heretofore been assigned a number in the "WPB" series, even though many were designated by other numbers in the "PD" series or other prefix; and the "control number" was used internally for record purposes only. Under the new plan, the so-called control number becomes the official form number.

The conversion table below lists the present series of forms and letters used widely in the metalworking industries and the numbers they will carry in the "WPB" series.

Old PD Number	New WPB Number
1A	541
1A Suppl	1524
1X	547
3A	542
4X	2034
4X-1	1739
4Y	2029
4Z	2167
9C	478
9D	1261
9E	2870
26M	309
27	2871
27A	2872
27B	2873
29	1020
30	1786
31	1802
32	247
40A	701
40M	702
49	76
53B	689
54	225
59	2953
59A	2954
59B	2955
59D	2956
59E	2957
59F	2958
59G	2959
62	410
66A	95
69	900
70	901
71	902
71B	1649
71C	1648
71D	2885
72	1242
76	2886
76C	2887
76D	1279
83	2888
83E	2889
83F	2890
83G	2891
83I	2892
94A:	
Sched. I	2893
Sched. II	2894
Sched. III	2895
96	1747
99	180
99A	971
99B	970
105	2896
105A	2897
107	167
114	165
123	2898
123C	2899
123D	2900
124	1713
138	929
139	928
148	1990
149	2903
150	2904
151	2905
156A	1450
169	652
169A	653
174	336
192	427
200	617
200B	1548
200C	2570
205	372
209A	2912
209B	2913
213	412
215	460
222A	1039
222B	1040
222C	1041
226	2914
226B	2915
228	1907
235	482
236	465
249	202
254	2919
254A	2920
272	554
283	620
285	576
293	2921
293A	2922
294	2923
294A	2924
295	604
298	2925
299	2926
300	646
303A	624
303B	623
304	622
307	616
308	838
310	663
312	599
314	1714
321	717
322	718
325	1276
326	2929
326A	2930
333	1436
336	825
338	675
344	759
351	707
356	660
359	763
360	765
376	749
377	751
378	750
380	2931
381	2932
385	1262
387	813
389	805
391	2933
391A	861
394	939
395	831
399	863
400A	2937
400B	2938
400C	2939
404	841
408	837
411	1236
412A	1180
413	824
414	748
415	931
416	975
418	924
419	923
420	930
421	894
424	967
425A	1034
425B	1035
426	940
428	867
429	868
430	869
440	949
441	945
442	983
443	2032
447	938
450	1010
451	1011
452	1012
453	1013
464	1017
466	829
470	1161
474	865
480	1085
483	1076
484	1033
487	1097
488	1102
489	1098
494	1103
496	1122
497	1123
499	1066
500	1477
500B	2242
501	977
502	978
504	1147
512	1110A
513	1110B
514	1110C
516	1157
519	1182
520	1158
530	1005
532	1200
537	1132
542	1212
543	1305
543A	1306
545	1290
545A	1784
545B	2154
556	1319
559	1228
560	1229
562	1237
566	1263
567	1293
568	2026
571	2941
572	2942
574	1344
575	1335
578	1379
581	2943
582	2944
585	1359
586	1360
592	1402
595	1447
597	2071
599	1334
600	2945
601	2946
602	2947
603	1940
612	1385
614	1383
615	1475
615B	1474
616	2948
616B	2949
616C	2950
620	1414
628	1545
630	1768
637A	2226
637B	1835
638	1509
638A	1529
639	1510
641	1565
654	1627
655	1600
658	1628
662	1490
665	1790
667	1646
668	1612
669	1313
670	1313A
671	1313B
672	1709
673	1707
674	1682
675	1687
676	1685
677	1706
680	1655
681	1593
685	1696
688	1688
695	906
697	1689
698	1804
700	1722
701	1767
704	1791
706	1787
707	1770
708	2060
711	1673
712	1732
716	2001
717	1887
718	1937
722	1843
723	1867
725	1751
727	2148
728	1906
729	1905
731	1915
733	1839
734	1837
735	1838
738	1801
740	1808
741	1953
742	1820
743	1995
744	1823
745	1806
746	1805
747	2002
748	1888
749	1889
750	2006
751	1824
752	2022
754	1902
755	2020
758	2021
759	2069
760	2040
761	2117
762	1765
765	2163
767	2179
774	2232
776	2278
782	2188
786	2289
787	2290
788	2413
789	2272
792	2317
794	2330
803	2401
804	2407
805	2362
806	2420
807	2421
810	2446
812	2345
813	2932
814	2472
815	2406
817	2935
822	2477
826	2433
827	2474
828	2499
829	2277
830	2449
831	2448
833	2524
834	2507
835	2461
839	2545
843	2578
844	2585
845	2494
846	2582
847	2661
848	2583
850	2591
851	2631
852	2191
853	2639
854	2664
855	2663
859	2522
860	2682
864	2665
865	2531
866	2532
867	2683
868	2679
869	2680
870	2613
871	2650
874	2526
877	2936
885	2782
886	2781
887	2780
888	2779
900	3000
900.01	3000.01
900.02	3000.02
900.03	3000.03
900.04	3000.04
900.05	3000.05
900.06	3000.06
900.07	3000.07
900.08	3000.08
900.09	3000.09
900.10	3000.10
900.11	3000.11
900.12	3000.12
900.14	3000.14
900.15	3000.15
900.20	3000.20
900.30	3000.30
901	3001
901.10	3001.10
901.13	3001.13
901.20	3001.20
901.21	3001.21
902	3002
902.06	3002.06
902.16	3002.16
902.17	3002.17
902.18	3002.18
902.21	3002.21
902.22	3002.22
902.23	3002.23
902.24	3002.24
902.25	3002.25
902.26	3002.26
902.27	3002.27
902.28	3002.28
902.29	3002.29
902.31	3002.31
902.32	3002.32
902.33	3002.33
902.37	3002.37
902.40	3002.40
902.41	3002.41
903	3003

Old UF Number	New WPB Number
5	1127
8	2567
11	2519
12	1131
13	327
14	198
15	331
17	2656
18	2652
19	2653
20	2655
21	2654
22	2641
23	2643
24	2642
25	2645
26	2710
27	2330
29	1132
30	2774
31	2717

Old CMP Number	New WPB Number
7	2254
8	2633
11	2444
12	2476
13	2360
19	2530
20	2549
21	2538
22	2681
23	2593
24	2685
25	2714
26	2787
27	2767



Information supplied by an Industrial Publication

Tool breakage—even in what was once considered "normal amounts" is something to be avoided by any means today. Replacement supplies are hard to get, and the possibility of tool shortages is too serious to permit temporizing.

In many cases breakage can probably be considerably reduced by educating operators in the proper use of cutting tools. In some instances, redesign of the tool may be the remedy.

Redesign was the solution in the case of countersink drill bits used in an aircraft factory. Bits having cylindrical pilots often broke when the center line of the bit was at an angle with that of the drilled hole. Run out in the spindle could easily cause such deflection.

The remedy suggested by an employee consisted of equipping bits with a spherical, or ball shaped, pilot. Such a pilot has the effect of making bits self aligning. Deflection through a relatively wide angle cannot concentrate enough stress at the neck of the pilot to cause breakage, because the end of the bit is not rigidly held.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

MOLY

Climax Mo-lyb-den-um Company
500 Fifth Avenue • New York City

By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

General Motors research chief not impressed by some of the claims being made for the future of the light metals. . . Discounts idea steel should come out the loser in the fight for postwar markets. . . Aluminum is a challenge

DETROIT

STEEL airplanes in production before aluminum automobiles—that's the prediction of C. F. Kettering, General Motors Research chief, who took a squint at the future for the benefit of a few hundred Society of Automotive Engineers' members meeting here recently. He says he is not impressed by some of the claims being made for the future of the light metals in the transportation field, and is willing to lay a little bet that there will be a steel airplane ready before anyone has successfully redesigned the present steel automobile into aluminum and magnesium.

When the aluminum adherents point out to "Boss Ket" that their metal is only one-third the specific weight of steel, he comes right back, "But steel is five times stronger than aluminum."

The GM research wizard, however, adds that he is getting a little tired of hearing steel company representatives cry about the danger of losing their postwar markets to the light metals. They say that research is being pushed so actively in the light metals field that steel is bound to come out the loser. When Kettering asked them why there was not a similar amount of research being pushed in the steel industry, they answered with the statement to the effect that "there is nothing much more to be learned about steel." This, Ket maintains, is utterly ridiculous, and only serves to emphasize a point he continually makes—that research has only begun to scratch the surface in finding answers to things that have baffled men for ages, and that the future of industry lies in a full understanding of what research can and cannot do.

Regards Research as Insurance

Research men, says Kettering, are just "professional amateurs," men who know how to say intelligently that they know very little about a lot. What after all, he asks, is a factor of safety but an admission by the research man that only this percentage of his figures is correct? A factor of safety of 5 to 1 means the research man or designer is betting his figures are only 20 per cent correct!

One of the fundamental values which a mechanized war brings to industry is the acceleration of knowledge and research into various types of new materials. The war-imposed shifts in material utilization cannot help being reflected in a better understanding of material usage in the postwar period.

Kettering likens research to an insurance policy taken out by management to prevent a company from being outdistanced by its competitors by virtue of the latters' enhanced technical knowledge. It is impossible to budget research like an operating department, for the smart research man never knows how much work he is going to have to do in a given period of time. Nevertheless, many managements attempt to budget their research departments, a policy which has the end effect of stultifying progress and leads to such proposals as the Kilgore bill now in Washington which would nationalize and centralize all industrial research. Kettering believes this is a dangerous plan, but cautions that unless research activity is given more recognition by competitive business, federalization may result.

It is difficult to report a Kettering address, even though it is always intensely interesting to hear. He is given to conversational rambling and to the reuse of homely examples (why is the grass green? why can you see through a pane of glass? what makes your hands warm when you rub them together?) often to the point where the GM press relations men say that if you want a copy of a Kettering speech they can give it to you in the form of a reprinted talk which he gave umpteen months ago at Siwash University.

"Bats Equipped With Radar"

One of his latest "gags" is the story about Harvard scientists discovering that the reason a bat could fly in the dark was because bats are equipped with a "natural radar" or means to project radio frequency waves from their throats, waves which will rebound from obstructions and resonate on the animals' ear

TRUCKS FOR RUSSIA: Military transports for the Red Army are assembled beside railroad tracks in the open desert in Iran while a special plant is constructed for the Army Ordnance Department. The plant is one of three, two in Iran and one in India, constructed by General Motors for assembling several makes of military vehicles, including Chevrolet and GMC trucks

drums, warning them to steer a different course. Kettering says he can't understand why the patent office would grant a patent on the radar principle when bats used it for centuries!

The two-day S.A.E. meeting was concerned primarily with discussions of war materiel, as reported briefly in STEEL for June 14. An important contribution was a paper by Lieut. Col. R. J. Icks of the Tank-Automotive Center on various types of tank engines. Col. Icks pointed out that the development of engines for tanks has been almost entirely a matter of adaptation of engines originally built for other uses and that even now the military does not feel it has a satisfactory tank engine. Briefly what is desired is an air-cooled engine with high enough horsepower-to-weight ratio to overcome losses due to accessories and power train, capable of utilizing a wide range of fuels and equipped with an air cleaner which really cleans.

Losses from rated horsepower to horsepower delivered at drive sprockets in tank engines are astonishing. For example, a 400-horsepower engine in a medium tank operating at about 16 miles per hour speed in fourth gear will lose 75 horsepower to air cleaners, mufflers, fan and accessories; and another 120 horsepower to the power train, with the result that only about half of the rated horsepower is delivered to the drive sprockets.

Greater Air Flow Required

A major obstacle to the use of liquid-cooled engines in combat vehicles is the greater air flow required and the consequent difficulty involved in their cooling. The reason for this, as explained by Col. Icks, is that whereas the fins of air-cooled engine cylinders in operation rarely will drop below the perfectly satisfactory temperature of 325 degrees Fahr., 225 degrees Fahr. is usually considered the practical limit for radiator temperature in the cooling system of a liquid-cooled engine. Assuming operation at an ambient temperature of 125 degrees, the liquid-cooled engine permits only a 100-degree temperature differential while the air-cooled engine has 225-degree range in which to work. Additional weight involved in liquid cooling is another argument against its use.

Overall requirements of the ideal tank engine as worked out by a special engine committee of the T-A-C include 650 gross horsepower; horizontal or V-type engine; air cooling; injection system capable of handling diesel fuel, gasoline or other available fuels; and 1000 hours operation without major overhaul. Discussions finally simmered down to two engines developing 450 and 650 net brake horsepower and gross brake horsepower, respectively, at governed speed of 2500 r.p.m., the engines to be in-line Vees, one 8-cylinder and the other 12-cylinder.

Engineers have been speculating about the possibilities of using the diesel-electric drive principle for tanks, perhaps starting with a single diesel engine driving a generator which supplies power for two 450-horsepower motors. This would eliminate some of the difficulties involved in the present power train, although there would still be something like a 15 per cent loss through both the generator and the motors, leaving about 72 per cent of the diesel power at the sprockets. The smoothness and high-torque features of this type of drive, exemplified on diesel-electric locomotives, suggest interesting possibilities for combat vehicles, but they may have to be held off until the next war, if you can place any credence in the even-money betting that the European war will be over by Dec. 1.

POSTWAR AUTOMOBILE REPRINTS AVAILABLE

The special report to industry on The Postwar Automobile, which appeared as a series of four articles in Mirrors of Motordom, April 12-May 3, 1943, has been reprinted in a 16-page booklet. Copies now are available free of charge to regular subscribers through STEEL's Readers Service Department, Penton building, Cleveland, Ohio. A charge of 5 cents each will be made for quantities of ten or more.

Concerned over recent cancellations of government contracts totaling up in the millions of dollars, the automotive industry has rushed the organization of a committee to study immediately problems involved in termination of military contracts. The committee is headed by J. H. Marks, Packard Motor Car Co., veteran purchasing department executive. Other members include K. J. Ammerman, Borg-Warner Corp.; I. B. Babcock, Yellow Truck & Coach; Albert Bradley, General Motors; E. R. Breech, Bendix Aviation; W. P. Brown, Briggs Mfg.; D. J. Buell, Buell Die & Machine; C. C. Carlton, Motor Wheel; E. A. Clark, Budd Wheel; B. E. Hutchinson, Chrysler; M. L. Peale, Republic Aviation, and R. I. Roberge, Ford Motor Co.

What the committee probably will do is to draw up a standard form or procedural contract and attempt to persuade the armed services to have it incorporated in present contracts for production items, to the end that a sudden cancellation, occasioned by either a shift in military strategy or discovery of oversupply, will have less serious impact on the contractor.

Reports that Nash-Kelvinator will build helicopters under license from United Aircraft Corp. have proved correct, the Sikorsky Aircraft division of UAC announcing that an army design is already being built at its plant in Bridgeport, Conn., which Nash will tool up to build in quantity. The model is a closed-cabin type with landing bags instead of wheels. From pictures it appears to be a steel tubular framework covered with the conventional coated aircraft fabric, not calling for any great amount of manufacturing ingenuity in its construction, although naturally parts and fittings would have to be machined to precise limits in keeping with standard aircraft technique.

Announce Helicopter Plans

What many felt was just an attempt to capitalize on the news of the Nash contract was the announcement by Pennsylvania Greyhound bus lines of application filed with the Civil Aeronautics Board to operate 60,000 miles of helicopter air lines, with a Detroit-Flint route being the first "guinea pig" run. Bus company officials state the helicopter now being built for the Army will carry seven passengers and their luggage, while a design on which Sikorsky is working will carry 14 passengers. The plan is to use the 7-passenger models on the Flint run, charging a fare of about 4 cents a mile, or $2.20 one way.

This is all just dandy, except that there are no helicopters ready yet, and the one or two models thus far built are in no sense fully tested equipment. Furthermore it is just idle fancy to figure a helicopter could be run between Detroit and Flint on a profitable basis for $15.20 per trip.

Annual meeting of the Automotive Council for War Production was held last Thursday in Detroit and drew attendance of close to 600 at morning, luncheon and afternoon meetings, all of which were of a closed nature. Three of the most urgent problems in industry today—procurement, manpower and materials control—made up the agenda for discussion by industry leaders and Washington officials, headed by Maj.-Gen. Lucius D. Clay, director of material, General Staff Corps, Army Service Forces; J. A. Krug, program vice chairman of WPB, and L. A. Appley, executive director of the WMC.

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Employing the HPM Closed Circuit system of shockless operation, these large HPM Fastraverse Blankholder Presses with variable 6 point pressure ram resistance on the periphery of the blankholder ring are especially adaptable to the deep drawing of large aircraft parts. The pressure of each of the six blankholder rams can be adjusted individually and independently. Separate hydraulic die cushion fitted into the press bed can also be used as an ejector, when desired. The two slides locked together give single action service increasing the maximum pressure capacity to 1000 tons. Investigate this versatile press for both present and future deep drawing requirements. » » »

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WING TIPS

Ford Willow Run plant beginning to get encouraging results from application of automobile production methods to construction of B-24 bombers. . . Output of center wing section upped 700 per cent in past eight months

APPLICATION of automobile manufacturing methods to construction of B-24 bombers at the Ford Willow Run plant is beginning to bear fruit. Figures on the center wing section reveal that in the last eight months production has increased 700 per cent. Decrease in man-hours required to build the section is 92.6 per cent, while decrease in cycle time, or actual construction time, is 94 per cent.

Center wing section of the B-24 is the "heart and lungs" of the ship. On it hangs the fuselage, fore and aft, and underneath are supported the bomb racks with their loads. In addition, the 55-foot center section carries the bulk of the plane's gasoline, the two 56-inch wheels of the retractable landing gear, and four 1250-horsepower engines.

The Ford idea from the start has been to break down the various operations needed to complete assemblies of the center section, separating them into many subassemblies which make it possible to use more workers, who can be employed at different locations. As an example, the skin and stringers are joined together on separate fixtures before they are taken by crane direct to the fixture holding the embryo center wing, where they are attached as complete units to the spars and bulkheads which are the supporting framework.

This operation was termed impractical when Ford engineers proposed it. It was not believed that large sections of skin could be made to fit accurately unless drilling and riveting took place on the same major fixture.

Ford experience with interchangeable parts gave the engineers confidence that if the preliminary operations were located properly and fitted with relation to those following, the resulting parts should fit wherever they happened to reach their assembly.

Actual figures on the new method of skin and stringer assembly show a 300 per cent increase in production and 62 per cent decrease in man-hours.

Two recent developments in the center wing section subassemblies further illustrate how the production rate is being increased and tremendous man-hour and time savings achieved. An automatic spar riveter is riveting 1300 rivets in 37 minutes with three operations, replacing an operation which occupied the time of five workers and consumed 2½ hours. In this one subassembly department alone, the man-hour time for a completed spar has been reduced from 116 to 24.

An ingenious multiple head drill now drills 716 holes in a skin splice automatically in eight minutes with one man operating it. This replaces a two-man operation which took 45 minutes.

Value of Plane Output This Year To Total Fourth of War Budget

VALUE of cargo and combat airplane production of the aviation industry this year will reach a total of over twenty billions of dollars, a fourth of the war budget for the year and almost a seventh of the estimated national income. The staggering total contrasts sharply with the $3,700,000,000 worth of automobiles and trucks produced by the motor industry in its best year, 1941, representing 5½ times the auto industry's peak production.

These facts were salient points in a recently issued *Report on American Air Transport*, from the Office of War Information.

The report reviews the picture of wartime air transport by the Army's Air Transport Command and the Navy's Air Transport Service, which together are now averaging several hundred trans-Atlantic flights a week alone, with the number steadily increasing. About the bulkiest objects now being moved by air are airplane engines; these and plane parts of all kinds form frequent air car-

Before and after: Illustration at left showing old method of drilling skin splice, using a jib with drill heads traveling on overhead rail. At right is shown the new multiple head drill, making six holes at a time in the splice which rolls underneath it. The latter system drills 716 holes in one splice in 8 minutes, against the former method requiring two operators 45 minutes to do the same work

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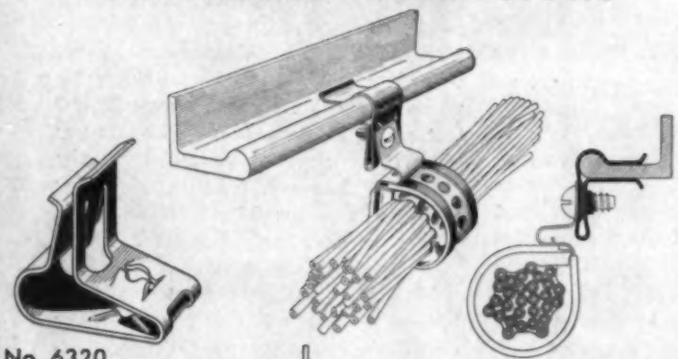

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For example: To meet the need for better and faster fastenings on beaded extrusions, up comes SPEED NUT No. 6320. No more holes to drill—no structural weakening. Just snap it on and turn the screw. For attaching conduit, piping, and wire harnesses, it's a record breaker! Again, with the present rapid conversion to rolled sections, SPEED NUT No. 6337 is doing the same record job on "Z" stringers. Hundreds of different Speed Nut designs already have saved millions of man-hours. Calling out SPEED NUTS for MORE of your non-structural attachments will do the same for you. First step is to send us your details today.

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Speed Nut System

—FASTEST THING IN FASTENINGS

Automatic riveting machine developed by Ford Willow Run engineers for riveting the main spar assembly for the center wing section. Manual riveting formerly took five operators 2½ hours. The machine requires only three operators, two of them rivet loaders, and the job of placing 1300 rivets is accomplished in 37 minutes

goes at present, with speed being the keynote.

Examining American cargo-carrying planes, none of which has been expressly designed for this purpose—all of them converted airliners or bombers—the OWI points out that converted B-24 bombers, for example, in their cargo version, the C-87, are so constructed as to require loads to be carried in a concentrated location. Lack of available space for loading within balance limitations both fore and aft of the center of gravity greatly limit their cargo load capacity, and the weights and balance officers who supervise their loading have to exercise great care in distributing weight, particularly toward the tail.

Similarly, present models of flying boats are particularly ill-suited to the carrying of bulky cargo due to the small size of their hatches and the division of the plane into compartments by bulkheads which for structural reasons cannot be removed.

Furthermore, says the OWI, engine choice, fuel capacity, landing speed and other specifications of all war cargo planes are aimed at general all-round utility rather designed for the greatest economical efficiency for a particular route.

The 434 airliners being operated commercially within and beyond the continental limits of the United States by the airlines in 1941 have been reduced to 256 as of Jan. 1, with 166 flying domestically only. The rest have been taken over by the armed forces, camouflaged in olive drab or blue, and are being "forced" a little more than when in airline passenger service—not only because they are carrying heavier payloads but because with normal fuel consumption an airplane covered with paint loses up to 12 miles an hour of the speed it flew when its bright aluminum surface was kept waxed and polished.

ATC Operates 90,000-Mile Line

Air cargo is prepared for ATC transport by the Air Service Command, which repacks manufacturers' goods so as to conserve weight and space, marks each object with a color indicating destination and holds cargo ready for loading in warehouses on ATC flying fields. The number of such fields scattered all over the globe and the number of planes operated by the ATC cannot be disclosed, but the fleet is operating over more than 90,000 miles of transport routes. To points within the Western Hemisphere, the ATC is flying better than 500 tons of cargo each week, and if the war continues into 1944 its routes will probably be ten times as long as the combined routes of all the world's prewar airlines.

With regard to current production of cargo transport planes, it can be said that more than one-fourth of all twin-engine and 4-engine aircraft manufactured in the year 1943 will be transports. Looking ahead, the OWI sees planes in the 100,000-pound and 120,000-pound class flying in quantity by 1945. (Consolidated Vultee now has a wood mock-up of a 400,000-pound plane at its Ft. Worth, Tex., plant under study).

Some of the claims being made for the future of air transport fail to take cognizance of the availability and expense of fuel, both limiting factors as long as airplanes fly on gasoline. (M. W. Smith of Westinghouse, sees great possibilities for future airplanes powered by gas turbines, as a result of improvements in high-temperature blading alloys used in turbosuperchargers). Too, original investment costs are still relatively high (a 4-engine bomber costs the service $450,000 to $500,000) and present planes are not ideally adapted to carry heavy freight long distances. Flights technically possible are often, as a matter of actual performance, still out of the question because of want of navigation facilities along the way or lack of adequate airports and repair shops, as well as refueling depots. Gasoline is heavy. On long-range flights, the weight of a plane's fuel may well surpass the weight of its engines. And if a plane flies to an area which is without oil resources, fuel for its return flight must be sent there somehow.

Twenty Types Under Test

The OWI concludes its 29-page report with a catalog of American transport aircraft, describing in essential detail over 20 types of planes now being built, flight tested or in the development stage for transport service. Those being flight tested include the Curtiss Caravan, C-76, a short-route cargo carrier with plywood (50,000 square feet) skin and two engines; the Lockheed Constellation, C-69, with four 2200-horsepower engines and pressurized cabin for flight over 20,000 feet at cruising speed of 255 miles per hour (now reported grounded by the Army at Burbank because of motor trouble); and the Martin Mars, Navy JRM-1, a four-engine 140,000 pound flying boat with wing span of 200 feet.

Not yet ready for flight test are the Waco C-62, a two engine all-wood plane of 33,500 pounds gross weight; the Fairchild C-82 part-metal 50,000-pound plane with a rear door that can be lowered as a ramp; and the fabulous Kaiser-Hughes HK-1 flying boat, with eight engines and 400,000-pound gross weight, all plywood construction. The latter is claimed to have 320-foot wing spread and 218-foot length, and some sections are reported now under static testing.

The OWI report mentions nothing, of course, about new military plane models nearing production, but there are literally dozens of these in various stages of development in a number of plants.

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

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NOTE: With this lubricant no special products are needed for "run in."

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CALL IN SOCONY-VACUUM

"WE'RE DOING IT RIGHT NOW"

Buffalo tool company lays solid foundations for peacetime activities without diminishing all-out war production. Advertising and selling program based on "delivery when war ends"

By JOSEPH J. CHENEY
President
Spriesch Tool & Mfg. Co. Inc.
Buffalo

THE HISTORY of American industry includes at least four previous chapters wherein war crises have forced us to forge our plowshares into swords. In each case, however, following relatively brief use (four years was the longest) of the swords to bring victory, we quickly have converted these swords back again into bigger and better plowshares which have made peacetime America the most envied country in the world.

As a practical American manufacturer who for the duration has gone all out for war production as the one and only way to hasten victory and a lasting peace, I predict that when—after this war—we convert from mass production of weapons to mass production of civilian goods, we will launch an industrial era which will dwarf in scope and in social implications anything that ever before existed anywhere. If I didn't have that faith, I certainly would not be hopeful for the future of America and for the troubled world which is going to depend upon America for its physical and spiritual reconstruction after the rule of the discredited dictators comes to an end.

Victory Is Primary Job

While industry's primary job still is to win this global war, and while it still is altogether too early to divert one iota of its productive effort or equipment from that job, it definitely is not too early at this stage of the struggle to divert some of the power of many of the most capable minds of this nation to the laying of practical plans (and I don't mean dreams) for the postwar era. That is why I now take a little of my time and of your time to say a good word for the project now actively being pushed by the Committee for Economic Development under the chairmanship of Paul G. Hoffman, president of the Studebaker Corp.

This committee predicates its activities on the belief that ". . . in the period following this war, the American people will expect those able and willing to work to have jobs with ample opportunities for advancement, and that business therefore should set as its goal maximum productivity and employment." To me that seems to be just another way of saying, "God helps those who help themselves," which certainly sounds sensible after a number of years of dreams and promises of "effortless prosperity." I never had any of that kind of prosperity.

When I find that men like Paul Hoffman, William Benton, W. L. Clayton, Chester C. Davis, Ralph E. Flanders, M. B. Folsom, Clarence Francis, Lou Holland, Charles R. Hook, Jay C. Hormel, Reagan Houston, Eric A. Johnston, Harrison Jones, Charles F. Kettering, Thomas B. McCabe, Reuben B. Robertson, Harry Scherman, John Stuart and Carroll L. Wilson, share my humble belief in the efficacy of hard work based on careful planning, I no longer feel alone as a rugged individualist.

"Everybody talks about it but nobody does anything about it," said Mark Twain of the weather. Now that postwar planning rivals weather as a topic of conjecture, what actually is being done about it?

Through widespread interviews, STEEL is seeking practical ideas on this subject, which we hope will serve to stimulate and guide our readers in their own planning.

One of the first of these interviews inspired this article by a man who always takes his coat off and gets right down to fundamentals of any problem—whether it be of design, tool engineering, production, manpower, or economics. We present Joseph J. Cheney of Buffalo on postwar planning.

—THE EDITORS

My own understanding of the primary object of the Committee for Economic Development is simply this. It is to get as many responsible industrialists and industrial organizations as possible lined up as soon as possible in the direction of constructive independent postwar planning so that hasty and unsound schemes will not be rushed through at the eleventh or twelfth hour. To my way of thinking, the response to this call will determine right here and now whether the ending of the war will bring private enterprise to a predicament comparable to "Custer's last stand," or whether private enterprise then goes on to win the peace as successfully as it now appears to be winning the war.

I for one am doing something about this right now—as a matter of fact I have been doing something about it for quite a while. What I am doing I believe ties right in with what Paul Hoffman's committee wants all of us to do.

The organization of which I share the managerial, engineering and manufacturing responsibilities came into being 20 years ago as a tool shop. Following some tough going in the early 1930s, we got it firmly on its feet as a company which could perfect and tool up metal products for clients and manufacture them in small or large quantities as desired. We got into war work before the actual crisis, through development of a successful bomb release shackle. This in turn led to the taking on of big orders for automatic bomb release racks, aircraft hardware, an aircraft cannon feed device and other and various materiel which cannot be discussed in detail until the war is over.

In converting 100 per cent to war work, we added greatly to our space and equipment and have trained numerous new workers—including many women—who are good and loyal members of our closely knit industrial family. These facilities and this organization represent assets which deserve postwar preservation and which can—I am convinced—be preserved more or less intact if we make good use of our concentrated wartime engineering, tooling and manufacturing experience when we reconvert from wartime to peacetime activities. In other words, we are not going to let down our associates (including those in the service) or sell America short by ducking out when the war ends.

We are going to stay in business and without in any way interfering with our

JOSEPH J. CHENEY

"I predict that when—after this war—we convert from mass production of weapons to mass production of civilian goods, we will launch an industrial era which will dwarf in scope and in social implications anything that ever before existed anywhere"

all-out war efforts, we already have laid solid foundations for our peacetime activities. We have done that through an active and successful campaign designed to line up a substantial list of companies which can make good use—immediately after the war—of our then freed designing and engineering talent, our broad tool engineering and manufacturing experience, our vision of postwar developments which surely will come out of the war, and our facilities, either to build pilot models of new products or to go into mass production on them.

Bear in mind that we are not advertising and selling any of these outright services "for delivery" as of the present time. We are advertising and selling them only as and when the war ends and we are released from our first line obligations to Uncle Sam and his allies. However, we do stand ready right now to do anything within our power to further the general cause of postwar planning if it will help Paul Hoffman and his committee.

Those who do not take postwar planning seriously—and they are too many—seem to have the idea that reconversion to peacetime production will simply mean starting up again right where they left off when the war began. They seem to think of the war as a mere interruption—following which their old lives and old activities will be resumed as they were, just as was the case following the awakening in H. G. Wells' book, *The Days of the Comet*.

Wise Planning Required

Any manufacturer who deludes himself with the idea that all he will have to do after the war is to dust off his jigs and fixtures and get going again on that model of whatever it was he was making in 1939, 1940, 1941 or even in 1942, is destined to find himself in just about the same predicament as Rip Van Winkle when he wanders into the postwar market places of the world with his product—regardless of whether it be a machine tool, agricultural machine, an automobile or whatnot. Not only will he find that his revived product is downright antiquated, but he further will find that his manufacturing methods are so far behind the times that he is completely out of the picture. That will be true of anyone who attempts to convert *back*.

Take, for example, agricultural machinery. When the war is over several millions of young men will come back to the farms after having received an intensive education in the operation, servicing and advantages of mechanisms of the highest type—including automotive vehicles designed to negotiate rough terrain, as well as aircraft. Will these men be satisfied any longer with agricultural machines of the conventional angle iron frame and cast iron bearing design?

They are going to demand something a lot better than that, equipment with antifriction bearings throughout, built of strong materials to get rid of a lot of deadweight, with comfortable seats, enclosed cabs, convenient controls and something on the outside other than bright red and green paint. Furthermore, they are going to know how to take care of such equipment and will not leave it standing in the fields as used to be done with the "angle iron" variety.

The place of the tool engineer in this postwar picture is going to be fully as important as it now is and has been in the wartime situation, and the experience which outfits such as ours have gained in this war is destined to play a big part not only in tooling up for postwar production but also in the actual development of postwar products. When the tool engineer works closely with the product designer, amazing savings can be effected not only through modification of designs for faster and more economical production but also through the elimination of unnecessary parts.

For instance, if we can show you how seven parts can be made to do better work than 12 parts in a moving mechanism, you save the cost of those unnecessary, extra five parts and the resulting product will cost less to maintain. That is exactly the sort of thing which tooling and development engineers have been doing on all sorts of war materiel and achievements such as this have had a lot to do with making possible the so-called "miracle production" of war products.

I will not attempt any further personal prophesies as to the postwar era, but will close by quoting the following from *Markets After the War* by S. Morris Livingston of the Department of Commerce: "This will still be a competitive world, wherein some businesses will prosper, while others will decline. Courage, imagination and ingenuity—plus practical, hard-headed, long-range planning—may create a volume of business far in excess of that suggested by any reasonable market analysis. Where these qualities are lacking, the most accurate appraisal of postwar markets becomes a futile gesture."

MEN of INDUSTRY

JOHN D. LEITCH

G. E. MERKLE

H. I. BARNSLEY

John D. Leitch has been named chief engineer, Electric Controller & Mfg. Co., Cleveland. Dr. Leitch has been with the company since 1937 and previously was associated with the mechanical engineering and electrical engineering departments of Steel Co. of Canada Ltd., Hamilton, Ont.

—o—

V. E. Blue, formerly employment supervisor, Dodge division, Chrysler Corp., Detroit, has been appointed to the staff of C. T. Winegar, director of personnel of the corporation. Mr. Blue has been with Dodge since January, 1916. He is succeeded as employment supervisor by **Carl E. Hustedt,** assistant in that office for a number of years.

—o—

R. M. Cherry has been appointed assistant manager, industrial heating division, General Electric Co., Schenectady, N. Y. Mr. Cherry has been associated with the company since 1919.

—o—

John R. Bangs, formerly head of the department of administrative engineering at Cornell University, has been named general manager of industrial and personnel relations, Edward G. Budd Mfg. Co., Philadelphia, with **Robert W. Desing** as his assistant at Budd's Hunting Park plants, Philadelphia, and **J. B. Jones** as his assistant at Budd field. **Dr. Edwin H. McIlvain** has assumed direction of an expanded industrial health and rehabilitation department for the company.

—o—

Herbert G. Dillon has been made manager of the newly-formed mining section of the industrial department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

—o—

George W. Person, formerly abrasive engineer, St. Louis territory, for Norton Co., Worcester, Mass., has been appointed manager, abrasive division, Screw Machine Supply Co., Chicago.

—o—

G. E. Merkle has been appointed sales manager, Perfex Gage & Tool Co., Detroit.

—o—

Harry G. Sparks, formerly vice president, has been elected president and general manager, Sparks-Withington Co., Jackson, Mich., and **Charles J. Kayko,** head of the radio division, has been elected a director.

—o—

R. Elliott Maxwell, vice president and director, Whiting Corp., Harvey, Ill., has been appointed export manager, with headquarters at 136 Liberty street, New York. Prior to joining Whiting Corp., Mr. Maxwell for many years was connected with the Carnegie-Illinois Steel Corp., Pittsburgh.

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Paul R. Mattix, formerly chief, automotive division, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, has joined the staff of the Automobile Manufacturers' Association, Detroit, as manager of the export department and secretary of the export committee.

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F. W. Conant, vice president in charge of manufacturing and **Arthur E. Raymond,** vice president in charge of engineering, have become members of the executive committee, Douglas Aircraft Co., Santa Monica, Calif. Major Carl A. Cover, executive vice president, has resigned to join the Army Air Corps.

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H. L. Bills, director of industrial relations, Acme Steel Co., Chicago, has been elected president of the Industrial Relations Association of Chicago.

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Melvin G. Williman, member of the American Institute of Mining and Metallurgical Engineers, has been named to the staff of Battelle Memorial Institute, division of mineral dressing research, Columbus, Ohio. **Clarence E. Levoe,** a member of the American Society for Metals, has also been appointed to the staff of Battelle Memorial Institute, and assigned to research on the high-temperature properties of metals.

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H. I. Barnsley, vice president, Jenkins Bros., New York, has been elected to the governing board of Jenkins Bros. Ltd., Montreal, Can. He is a member of the American Society of Mechanical Engineers, and the National Association of Power Engineers.

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Frank Perry Nemec has been named manager, purchasing division, lamp department of the General Electric Co. at Nela Park, Cleveland, succeeding the late **Fred P. Harris.** Mr. Nemec joined the company in 1922.

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Nelson E. Grace, vice president and factory manager, Doak Aircraft Co., Hermosa Beach, Calif., and **Leonard Comegys,** attorney, have been elected members of the board of directors. **Stephen F. Hinchliffe** and **Eldore E. Rosier** have been named vice presidents.

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R. A. Devlieg, since 1937 vice president in charge of manufacturing operations in Wisconsin plants, Nash-Kelvinator Corp., has been named vice president in charge of all plant operations with headquarters at Detroit. Before joining Nash-Kelvinator in 1935, Mr. Devlieg was vice president in charge of production for Reo Motor Car Co., Lansing, Mich.

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Ralph H. Norton, board chairman, Acme Steel Co., Chicago, has been re-elected president of the Associated Em-

A. M. WIBEL

Who has been appointed vice president of Nash-Kelvinator Corp., Detroit, as announced in STEEL, June 14, p. 87

ployers of Illinois for the next two years. **Chas S. Craigmile,** Belden Mfg. Co., Chicago, has been appointed vice president and **W. H. Hallsteen,** Ilg Electric Ventilating Co., Chicago, treasurer.

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Carl H. Vaupel has been appointed assistant general manager and **W. A. Luli,** factory production representative of Cooper-Bessemer Corp.'s plants at Mt. Vernon, O., and Grove City, Pa.. Prior to joining Cooper-Bessemer in 1941, Mr. Vaupel had been associated with the diesel engine division, Fairbanks, Morse & Co., Beloit, Wis., in various capacities; Northern Pump Co., Minneapolis, as Eastern sales representative and Aircraft & Diesel Equipment Corp., Chicago, as sales manager. Mr. Luli has been with the corporation for the past eight years.

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C. K. Swafford, works manager and member of the board of directors, Gisholt Machine Co., Madison, Wis., has been appointed vice president. Mr. Swafford will continue also as works manager, which post he has held since 1930.

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R. C. Freitag of Briggs & Stratton Corp., Milwaukee, has been elected president of Milwaukee Industrial Advertisers' Association to succeed **F. J. Nelson** of Macwhyte Co., Kenosha, Wis.

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Hans Lasker has been named works manager, Republic Aviation Corp., Farmingdale, N. Y. **Irving Keough** succeeds him as factory manager, **Donald Gutch** has been appointed general superintendent, and **Chester Kucyn** has been made production manager. **Henry MacDonald** has become works manager at Evansville, Ind.

CARL H. VAUPEL

A. G. HERRESHOFF

W. K. COOPER

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W. K. Cooper has been named vice president in charge of sales, Aviation Corp., with headquarters at 1155 Sixteenth street, Washington.

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Norman O. Aeby, purchasing agent, Johns-Manville Corp., New York, has been elected president of the Purchasing Agents Association of New York, while **Millard W. Merrill,** United States Metals Refining Co., New York, and **David M. Meeker,** Celanese Corp. of America, New York, have been made vice presidents, and **E. B. Fielis,** treasurer. **James H. Ewing,** Calco chemical division, American Cyanamide Co., has been elected a board member.

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A. G. Herreshoff, chief engineer of research for Chrysler Corp., Detroit, has been elected chairman of the Detroit section, Society of Automotive Engineers.

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E. T. Parks has been named general agent, Chicago, Burlington & Quincy Railroad Co., with headquarters in Chicago. **W. F. Radell,** assistant general freight agent, will succeed Mr. Parks.

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Edmond du Pont has been named vice president, Wilmington Chemical Corp., New York.

OBITUARIES . . .

Charles E. Lindell, 61, president and general manager, Lindell Drop Forge Co., Detroit, died in that city June 10.

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Luke U. Milward, 55, founder and president, Electro Refractories & Alloys Corp., Buffalo, died June 10.

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M. Joseph Diebolt, 65, vice president and treasurer, Buffalo Electric Co. Inc., Buffalo, died June 8 in that city.

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George L. Grimes, founder and owner, Grimes Molding Machine Co., Detroit, and special foundry representative for Baker-Perkins Inc., Saginaw, Mich., died in Detroit, May 28.

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Joseph Kouns Pollock, 80, veteran iron and steel executive, died June 14 in Cincinnati. Shortly before 1900, Mr. Pollock was treasurer, Indiana Car & Foundry Co., Indianapolis. Later he became president, Union Furnace Co., Ironton, O.; and vice president, Hanging Rock Iron Co., Ironton, O.

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Raiford Gaffney, general manager, Steel Heddle Mfg. Co., Atlanta, Ga., died June 10 in that city.

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Henry T. Paist, 78, former president, H. T. Paist Co. Inc., Philadelphia, died June 10 in that city.

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Edmond J. Caspari, 36, superintendent, construction machinery plant, West Milwaukee works, Chain Belt Co., Milwaukee, died May 31 in that city.

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Elmer T. Anderson, 55, president, Sisalkraft Co., Chicago, died June 10 at Elgin, Ill.

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Henry Kay Smith, 67, chairman of the board and of the executive committee of the Art Metals Construction Co., Jamestown, N. Y., and chairman of the Marlin-Rockwell Corp., Jamestown, N. Y., died recently in that city.

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Joseph Ujlaky Sr., 56, factory superintendent, Werner G. Smith Co., Cleveland, died June 13 in that city.

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Robert Emerson Brown, 46, Pacific Coast division manager, Electro Metallurgical Sales Corp., New York, died May 26 at Belmont, Calif.

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Madison F. McCarty, 55, for the past two years supervisor of the laboratories, Howard Foundry Co., Chicago, died June 13 in that city.

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Thomas S. Denny, 56, manager electrical and wire rope department and assistant manager, direct sales division, United States Steel Export Co., New York, died June 16.

Eastern Mines Push Production

Unprecedented war demand spurs development of new and old workings. . . Production in New York state to set all-time mark of 8,000,000 tons this year

UNPRECEDENTED war demand has spurred iron ore mining operations in the East to record levels. Large sums have been or are to be spent in development of sites and expansion of operations at long operated mines.

One of the chief problems confronted is the scarcity of men to operate the mines.

Iron ore mining in New York state is expected to reach an all-time record of between six and eight million gross tons this year, in sharp contrast with less than half a million in 1939.

A new central shaft is being developed by Republic Steel Corp. at Fisher Hill, N. Y., as a DPC project. The corporation leased mines from Witherbee-Sherman Co. in 1937. At its own expense Republic erected a wet process magnetic concentration plant at Mineville, N. Y., with annual capacity of about one million tons of concentrates. In 1938 the company took over the mineral properties at Lyon mountain and Standish. The corporation's mining capacity and ore concentrating facilities have been greatly expanded.

In 1941 Jones & Laughlin Steel Corp. leased 3200 acres of mineral lands from the Benson Iron Co. They have, in conjunction with DPC, carried through a $5,000,000 construction program at Star Lake. The program included establishment of mining and transportation facilities and erection of a concentration mill with annual capacity of 800,000 tons of concentrated and sintered ore.

National Lead Co. also took title to 11,000 acres of mineralized lands in the Lake Sanford area. The ore is a mechanically combined ilmenite-magnetite, carrying from 16 to 20 per cent titanium oxide. Through 11,000 feet of drilling, some 15,000,000 tons of ore have been blocked out. Mining is by open pit methods and present capacity allows treatment of some 6000 tons of ore daily; producing about 750,000 tons of magnetite concentrates annually, in addition to about half that amount of ilmenite concentrates.

M. A. Hanna Co. acquired large magnetite deposits at Clifton, N. Y., in 1941. Company has substantially stepped-up operations in recent months with still further improvement anticipated over the remainder of this year.

In addition to the above mining interests there are several small enterprises mining hematite on the Clinton formation. Further prospecting is being carried out in New York state at present, with promising possibilities of additional companies being actively engaged in mining before the year's end.

Other mining developments in the east include: Bethlehem Steel Co.'s properties at Mount Hope, N. J., and Cornwall, Pa.; Alan Wood Steel Co., at Scrub Oak, Wharton and Washington, N. J.; E. & G. Brooke Iron Co. and Warren Foundry & Pipe Co. near Scrub Oak, N. J.

Production Declined Steadily

First comprehensive survey of the mining industry in the United States credited New York with 1,126,897 long tons of ore produced, or 15.8 per cent of national output. However, in succeeding years production steadily declined in relation to the national total, until in recent decades output ranged between 1 and 2 per cent.

The large Adirondack magnetite deposits are characteristically low in iron, averaging in most instances between 40-45 per cent. They lend themselves easily to cheap magnetic concentration, which in most instances raises the iron content above 60 per cent. Ore deposits lie underground and are irregular in size and shape, frequently extending to great depths. One quantitative estimate of the non-titaniferous magnetites in New York places the reserves at 900,000,000 tons, running 40 to 65 per cent iron content.

In addition to the Adirondack magnetites there are known reserves of this ore in the Hudson Highland area. Hematites of better than 50 per cent grade occur both in the Clinton formation and St. Lawrence county. The non-titaniferous magnetites of the Adirondack region constitute one of the commercially most important reserves in the state and occur in several more or less localized areas within the region.

Supplementing iron ore in the present upsurge in mining activity in the state are several additional materials. Northern New York Mining Corp. is putting down a shaft on the zinc deposits south of Sylvia lake. The St. Joseph and Universal mines in the area are also producing expanded amounts of zinc ores. American Metal Co. has erected a new Pidgeon process magnesium plant, utilizing local dolomite, in southeastern New York. Production of abrasive garnet has been considerably stepped up at the Barton Mining Co.'s Gore Mountain workings, the largest mine of this type in the country. Increased output of graphite, mica and beryl is expected to take place in the immediate future.

Fog Bedevils Lake Shippers

Accidents cause loss of 700,000 tons in ore movement. Three vessels lost after collisions. Weather conditions cause congestion at Sault Ste. Marie

OLD MAN WEATHER, who delayed opening of lake navigation a full month, continues to bedevil iron ore shippers. More than 8,000,000 tons behind 1942 shipments as of May 1 last, fleet operators have since been hard pressed to equal last year's shipping rate because of the dense fogs frequently on the lakes.

It is estimated that about 700,000 tons of iron ore have to date been lost by accidents which damaged more than 20 vessels and resulted in sinking three. These were caused primarily by unfavorable weather conditions. If it were possible to take into consideration tonnage lost due to trip delays resulting from fog conditions forcing complete stoppage of passage through the Soo canal for as long as 24 hours at a time, and necessity of proceeding frequently at checked speed, the overall tonnage lost so far this season would be substantially greater.

Last week witnessed a series of vessel accidents. The GEORGE M. HUMPHREY of the Kinsman Transit Co. sank in the Straits of Mackinac after colliding with the D. M. CLEMSON of the Pittsburgh Steamship Co. The W. D. CALVERLY JR. of Hutchinson & Co. suffered slight damages in a collision with the steamship BREWSTER, which sank in the St. Clair river. The BREWSTER, British owned, was on her maiden voyage loaded with 83,000 bushels of grain. The United States Maritime vessel, ARMSTRONG, of the Interlake Steamship Co.'s fleet and STIFEL of Columbia Transit Co.'s line were damaged while in transit through the Soo canal. In addition to the above there is estimated to have been more than 15 other accidents to

(*Please turn to Page* 148)

First Steel Poured at New Homestead Works Expansion

STEEL for war weapons started flowing last week from the first of eleven 225-ton open hearths at Carnegie-Illinois Steel Corp.'s Homestead Works expansion project.

The project, completely integrated from blast furnace to finished products, has been hampered by priorities difficulties, lack of materials and manpower, but is expected to be completed by year's end. It will add 1,500,000 tons of ingot capacity and will strengthen Pittsburgh's position as a steel producing center.

The expansion is being financed by the Defense Plant Corp.

Changing Homestead's river-front skyline into a continuous panorama, the new facilities will include mills and shops for the production of slabs, plates, machined forgings, and rough-finished armor plate.

The site occupies 123 acres on which are located 80 buildings whose floor area alone covers 48 acres, all being served by 30 miles of railroad track.

It is estimated that 3000 men and women will be required to operate the new plant when completed, and to provide for competent personnel to operate these new facilities, intensive training programs have been under way for many months. Of course, under conditions of the war emergency, many women will be included in the working force.

An interesting feature in making room for the expansion project was the moving of Howard Axle Shop, a division of Homestead, to a new location 16 miles down the river to McKees Rocks area, all of which was accomplished without loss in production. Under normal operating practice at the Howard plant, that period on the week ends required for maintenance and repairs was utilized in moving, piece by piece, buildings, machines and furnaces to the new plant site where installation was completed in time for production to be resumed each Monday morning, with the axle plant operating at two locations simultaneously, Homestead and McKees Rocks.

Upon its completion, 25 ingot trains will move out of this modern open hearth shop every day.

Magnesium Production Starts in Louisiana

Production of magnesium metal at the newly erected magnesium-chlorine plant in Louisiana has been started by the Mathieson Alkali Works Inc., the operating company. The plant is owned by the Defense Plant Corp. and has a future capacity of more than 50,000,000 pounds of magnesium metal a year. Design and engineering of this project are said to be unique, and it is the only plant of its type in operation.

Principal raw material is dolomitic stone, a rock resembling limestone and consisting of calcium and magnesium carbonates which is shipped from nearby quarries. . This ore is calcined, locally produced natural gas being used for the purpose. The resulting oxides of calcium and magnesium are treated with calcium chloride, a product of the process by which soda ash is made at the parent Mathieson plant in Louisiana. The mass is then treated with carbon dioxide obtained from the calcination of the dolomite, which converts the calcium into insoluble carbonate, leaving magnesium chloride. This product, after being concentrated, is electrolyzed, forming magnesium and chlorine.

Magnesium metal in this plant is manufactured by a new process developed by Mathieson engineers which produces not only pure magnesium metal but also liquid chlorine, both of which are highly essential to the war effort. It is estimated, when running at full production, that this project will employ approximately 1000 workers.

World War II Soldier Uses More Steel

Fifteen hundred pounds more steel are required annually by today's soldiers, sailors and marines than were used by their fathers in World War 1. They also are being equipped with steels vastly superior in quality to those of 1917-18, according to the American Iron and Steel Institute.

For each of the estimated 7,000,000 men in the United States armed forces at the end of 1942, the American steel industry poured over 24,600 pounds of ingots in the course of its record-breaking production of 86,000,000 tons.

In World War I, the banner production year yielded only about 50,000,000 tons of steel. On the basis of the total mobilization of 4,355,000 men, an output of approximately 23,100 pounds of steel per man is indicated. The output figures for both World War I and 1942 include production of steel for all purposes, including export.

High-quality alloy steel production last year exceeded 11,350,000 tons, or somewhat more than 3240 pounds for every man in service. That is three and a half times as much alloy steel as was produced in 1918 per man under arms. In that year, slightly more than two million tons of alloy steels were made, or about 920 pounds per man.

Largely responsible for the tremendous increase in alloy steel produced per man in service is the present war's emphasis on air power and mechanized military equipment of all kinds.

ACTIVITIES . . .

American Propeller Corp., Toledo, O., produced almost three times as many hollow steel propeller blades for combat airplanes during the past six months as in the previous like period, the company announces.

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J. H. Williams & Co., manufacturer of drop forgings and drop-forged tools, has moved its general sales office of the tools division from New York city to Buffalo. A district sales office will be maintained in New York.

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McKenna Metals Co., Latrobe, Pa., has taken over the direct sales, engineering, and service of Grayson-Kennametal milling cutters. The cutters will be distributed and serviced by the national and foreign sales organization of the company.

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Inland Steel Co., Chicago, through purchase of all the capital stock of the Hillside Fluor Spar Mines, Rosiclare, Ill., will operate the new acquisition as a separate unit. Clarence B. Randall, vice president of the Inland Steel Co., is the new president of the Hillside firm.

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Ilg Electric Ventilating Co., Chicago, announces plans for a research laboratory to be constructed west of the present plant.

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Westinghouse Electric & Mfg. Co., until recently at 2211 West Pershing road, Chicago, will occupy the former Waterway Paper Products Co. plant on South Kedzie avenue. Westinghouse abandoned its former premises to make room for Army occupancy.

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Morton Mfg. Co., 5105 West Lake street, Chicago, is operating an auxiliary plant in Libertyville, Ill., where material for portable air field runways is being fabricated.

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Principal Die & Stamping Co., 816 West Erie street, Chicago, has constructed and occupied a plant at 3464 North Knox avenue.

Porter's view of a typical pullman car under wartime conditions. Most sleepers are crowded with servicemen, who, like civilians, have their shoes shined while they sleep

C'est la Guerre!

War riding the rails, traveler finds on trip through West. . . Stay home if you can, he advises. . . Heavy movement of troops and increased freight shipment put terrific strain on carriers. . . Huge postwar equipment replacement market seen

IT'S TRUE what they say about railroad travel in the West, if you are speaking from the standpoint of a passenger. If you can avoid it, stay at home! War is riding the rails in no uncertain fashion, and the principal western roads are bearing the brunt of an almost impossible freight and passenger load—not uncomplainingly and not politely—but they are bearing it.

We have ridden in recent weeks the Santa Fe *Kansas Cityan* from Chicago to Oklahoma City; the Illinois Central *Panama Limited* from the Windy City to New Orleans; the Southern Pacific *Sunset Limited* from New Orleans to Los Angeles; the Santa Fe *San Diegan* from Los Angeles to San Diego; the Southern Pacific *Morning Daylight* from Los Angeles up the coast to San Francisco; the SP's slow and lumbering *Oregonian* from Oakland to Portland and on to Seattle over the line operated jointly by the SP, the Union Pacific and the Northern Pacific; and the Northern Pacific's *North Coast Limited* from Seattle to Chicago.

All of these trains were once crack limiteds, none of them extra-fare trains, but at least with accommodations better than average and service a little above ordinary. Today, with the exception of the *Panama Limited*, the *Kansas Cityan*, the *San Diegan*, and the *Morning Daylight*, the first three diesel-electric streamliners, they are just trains which get you to and from where you are going—occasionally on time—and that is about all.

War, of course, is responsible.

Heavy movement of troops to and from the West Coast began almost with Pearl Harbor. In fact the railroads say they moved 600,000 fully equipped troops to West Coast points between Pearl Harbor and Christmas of 1941, just 18 days, and this without discontinuing passenger service. The army has taken over 50 per cent of the 6000 Pullman cars of the nation's railroads, perhaps 30 per cent of their coaches for troop trains alone. In addition there are thousands of service men constantly on the move, either on leave or special orders.

In addition to troops, there are thousands of others following them as they are shifted around the country—wives, families, parents, girl friends. Altogether, this huge moving mass of humanity literally jams terminals to the doors; swarms down on waiting coaches to grab available seats like droves of cattle; makes conductors, brakemen and train crews at times despair of their jobs, and easily succeeds in making the normal civilian business traveler feel himself a nuisance and interloper.

Move Masses of Servicemen

Just why this enormous movement of soldiers, sailors and marines is essential has never been fully explained, either by the railroads or by the armed forces. Even the servicemen themselves on the trains cannot explain it. Take the case of a navy photographer, stationed in Seattle who was sent clear across the country to attend school in Boston—and for only six days! Or the paratrooper who was moved from San Diego to Fort Benning, Ga., by way of Seattle, Chicago, Evansville, Knoxville and New Orleans.

The idea seems to keep the boys on the move. Possibly this is to avoid their getting in a rut at one camp, or to improve their morale by letting them see the country as they learn the various military arts.

One result of this mass movement of servicemen is that Western roads have taken off passenger trains all normal deluxe equipment, such as observation cars, club cars, lounge cars, etc. Official explanation is that this equipment has been converted to coaches, but if you get a brakeman or a conductor off in a quiet corner he will usually confess that the principal reason for dispensing with this equipment was to counteract the destructive exuberance which servicemen seem

to display or to acquire when aboard trains. It was simply a matter of saving the equipment from the blitzkrieg.

Further result of passengers being predominantly servicemen has been the suspension of serving alcoholic refreshments of any kind on virtually all the Western roads. However, in spite of MPs and SPs on every train, the boys seem to manage their refreshments somehow. It is an amusing sight to watch a train stop for five minutes at a small city on a transcontinental run, and see the rush to the drug store around the corner from the station and the race to get back before the conductor shouts, "All aboard!"

Dining car service likewise has had a rude jolt because of heavy travel and the impact of rationing. Menus are skimpy and in general the food is a long way in taste from what it was two years ago. Railroads all complain about how difficult it is to handle the food situation in the face of rationing, but they do not explain whether, because of the fact they are feeding so many servicemen, they do not receive extra allowances of rationed items. Certainly if the supply of food to army camps is unlimited, assistance should be given railroad dining car services. There does not appear to be any unusual shortage of butter or sugar on the diners—but the entrees (as of April) are generally confined to fish, turkey or eggs.

They used to call it the Friendly Southern Pacific, but this has now been changed to the Frenzied Southern Pacific. The Sunset Limited, from New Orleans to Los Angeles, has deteriorated the past two years. When this traveler arrived in Los Angeles only 15 minutes late after the three-day ride, the weary porter on the car said it was the first time since Pearl Harbor that the *Sunset* had been that close to making its schedule.

Postwar Opportunities Excellent

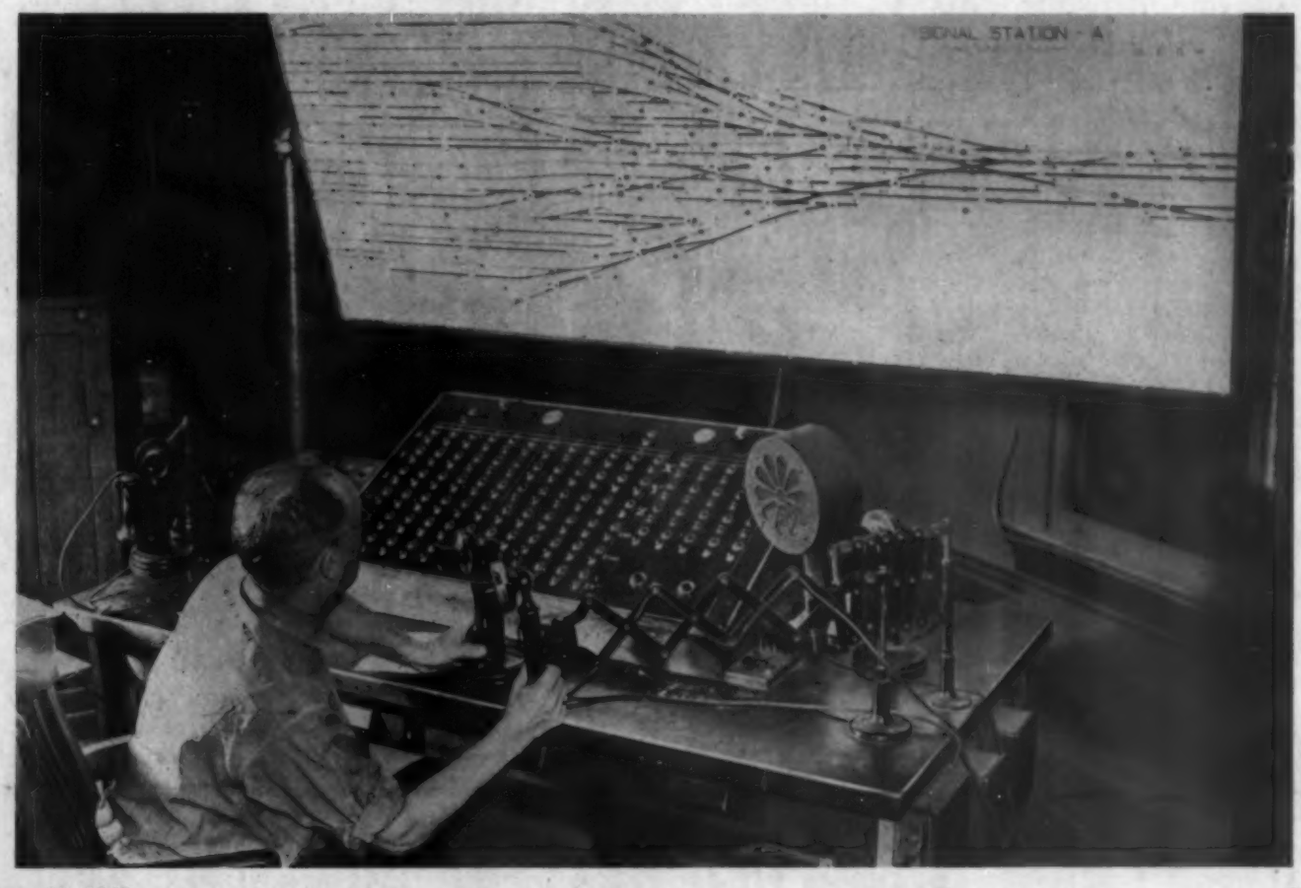
Postwar opportunities for selling locomotives, cars, and rails to the western roads should be tremendous. While only a few years ago, some of these roads were tottering on the brink of what looked to be bankruptcy, they are all cashing in heavily today and their equipment is wearing away rapidly. Cars and engines which railroad men tell you they are ashamed to look at and which should be in museums if not the junkpile are rolling back and forth daily. Strange mixtures of freight and passenger steam locomotives are seen on nearly all multi-locomotive trains.

Rails are holding up fairly well, in spite of the fact that the bulk of western trackage is of the single variety, with convenient sidings for passing trains. However, heavier rails would appear in order in many sections, since casual inspection does not reveal the use of 130-pound rail to anywhere near the extent of eastern railroads. Very few experiments have been made with welded rail sections, but the idea has distinct merit to avoid rail end batter. Some use is made of the Sperry magnetic rail flaw detector cars by western roads. It has proved successful in sounding out flaws in rail sections which might otherwise go unnoticed.

The problem of operating a single-

In no sense intended as a complete survey or final judgment on the railroads of the West, the accompanying article prepared by one of STEEL's field editors in the course of a trip from Chicago to Oklahoma City, and a later jaunt from Chicago to New Orleans and on to Los Angeles, San Diego, San Francisco, Portland, Seattle and back to Chicago, may be of interest, since it reflects impressions of travelers, trainmen, servicemen and many others now traveling the rails to and from those points—The Editors

Train directors have added responsibilities in routing trains to expedite the movement of soldiers and war materiel



track system these days, with a continual stream of freight and passenger trains moving in both directions is one which makes a dispatcher slowly go crazy. The dispatcher on one of the Texas divisions of the SP told this writer that his job is just 8 hours of steady pounding, with never a moment's rest; that when he quits a trick he is literally limp. Biggest trouble a dispatcher encounters is when one train gets behind schedule because of breakdown or other interruption. This throws out the whole division and calls for some skilled manipulating where a dispatcher must figure out his orders and transmit them to passing train crews.

Of course, automatic blocks and automatic switch control could relieve a lot of this, but such refinements cost plenty of money, especially on long stretches of right-of-way where until recently there has been no particular problem in maneuvering trains safely by the old methods.

Virtually all passenger train schedules west of Chicago have been slowed down by the Office of Defense Transportation in recent months. While this may be construed partly in the interests of safety, it also permits operations closer to schedule, since by opening up the schedule an engineer can often make up two or three hours lateness in several hundred miles of run. For example, the *North Coast Limited's* second section was 2 hours and 30 minutes late arriving at Spokane, Wash., after leaving Seattle on time, the result of an engine breakdown in the night. Yet by highballing a little here and there, except where grades and mountain curves did not permit it, the *North Coast* pulled into Minneapolis, 1075 miles away, right on time.

The "streamliners" are the glamor girls of the western roads' passenger train chorus. Trains like the Santa Fe's *Super Chief* and *El Capitan* and the *San Diegan* fleet; like the Union Pacific's *Portland Rose*, and the Southern Pacific's *Morning Daylight* are the talk of all travelers, and have brought to railroad passenger travel an entirely new era which is only interrupted by the war. Modern stainless steel and aluminum construction, roller bearings, superb interior appointments and novelties, positive air conditioning, smooth starting and effortless speed put the streamliners far and away ahead of their old puffing brethren.

Passenger cars await servicing, cleaning and repairs in a terminal before being made up into trains to transport servicemen and civilians on essential business. NEA photo

There is no question that diesel-electric railroad power, where it can handle the load and where oil resources are ample, will take the play away from steam. But they are already talking in southern California of only 10 to 15 years more of oil in the wells there, of starting to import 50,000,000 barrels a year in five years, so where does this leave the diesel-electrics? The most obvious answer is that it simply knocks out the diesels and leaves the electrics, entailing the considerable investment of electrifying long stretches of roadbed, such as the Chicago, Milwaukee & St. Paul has already well under way on the northern run across from Seattle.

Coastal rail travel, from Los Angeles north to San Francisco, Portland and Seattle, is far more congested than the transcontinental runs, although the latter are bad enough. It is virtually impossible to obtain Pullman reservations from, say, Los Angeles to Portland, unless you make them three to four weeks in advance, and even then you run the chance of having your reservations sold a second time, leaving you high and dry.

On top of this the shocking case of "Lower 13" on the *Oregonian* has made passengers, especially women, jittery, a feeling which is reflected even in the attitude of porters, waiters and train crews.

If you can transcend the pushing and pulling of wartime rail travel, there are few rides which for sheer beauty can compare with the 470-mile coastal run from Los Angeles to San Francisco on the SP's *Morning Daylight*.

The train itself is the last word in streamliner comfort, even to an announcer who unreels the story of the trip through loudspeakers in each car as the train speeds along. The *Morning Daylight* (there used to be a *San Joaquin Daylight*, now taken off) is one of the few trains in the country equipped with elevating baggage racks in each car.

One of the most complicating factors in the freight picture of the West is the appalling amount of cross-hauling. The best example of this is alumina or aluminum oxide which has to be shipped all the way from the Gulf Coast to reduction plants in Portland, Vancouver, Wash., Longview, Wash., and Los Angeles; then the pig aluminum has to be moved back east for rolling, except for a new rolling mill at Spokane, Wash.; then the rolled material shipped back to Southern California and to Seattle for use in airplanes.

Reduction plants in the West have capacity for supplying roughly one-third of the 2,000,000,000 pounds annual capacity the aluminum industry will have by the end of this year. Virtually all of this is reduced alumina prepared from bauxite ore. The alumina is a fine powder which is blown into paper-lined box cars for shipment, and for every pound of pig aluminum produced there must be roughly 2 pounds of alumina shipped. With West Coast reduction units scheduled to be producing at a rate of some 50,000,000 pounds of metal a month, inferring requirement of 100,000,000 pounds, or 50,000 tons, of fluffy alumina you get an inkling of the transportation problem involved.

But the railroads of the West are doing a job; you cannot take that away from them. The *Daylight* snakes its way up the mountain back to San Luis Obispo; the freights roar into Oakland with steel for the shipyards; the packed troop trains wait on sidings for limiteds to pass while a thousand khaki arms wave from the windows. Pullmans may be dirty, windows grimy, no towels in the washrooms and only two meals a day, but still they pile through, day in and day out.

Dominion High In Metal Output

Former imports now exports. War production changes met by flexible planning

TORONTO, ONT.

ALL RECORDS in production of nonferrous metals will be broken this year by Canada, C. D. Howe, minister of munitions and supply, recently told the House of Commons. This will follow the enormous expansion of the aluminum industry; development of a Canadian process for magnesium production; extension of recovery operations at large base metal mines; revival of old mines and expansion of existing properties; development and exploitation of marginal and sub-marginal deposits.

He revealed that during second half the country will be well on its way to self-sufficiency in tungsten, production of molybdenum will provide the major part of requirements, mercury is being exported where before the war imports furnished the only source and the government-owned magnesium plant supplies all needs and leaves a margin for export where the country formerly was entirely dependent on imports.

The aluminum industry, he said, now provides more than six times the output of 1939, is greater than total world production in 1939 and equals 40 per cent of the war requirements of the United Nations. In copper, nickel, lead and zinc aggregate refined production for 1943 is estimated at 827,800 tons, against 662,100 tons in 1939. Canada now is producing 95 per cent of the combined nickel output of the United Nations, 20 per cent of the zinc output, 12½ per cent of the copper, 15 per cent of the lead, 75 per cent of the asbestos and 20 per cent of the mercury. While not yet self sustaining in fluorspar, output has been increased materially and further expansion is under way, Detomac Mines Ltd. now installing equipment for large production.

Changes Affecting War Program

A number of radical changes are being made in the war production program, Mr. Howe told the Commons. He said offensive power measured in guns, ammunition, aircraft, vehicles, ships and scientific equipment has placed Canada fourth among the United Nations. Major objectives have been reached in supply of ground equipment for the Army. This does not portend slackening in effort but a change in emphasis, due to greatly increased demand for naval vessels, guns and equipment, combat aircraft and radar equipment.

Mr. Howe stated that "late in 1942 we were delivering in substantial quantities every item of war equipment for which we had received orders in the first two and a half years of the war. Every week we are launching six or more vessels, either escort, cargo or patrol. Every week we are turning out 80 planes. Each week our automobile plants produce 4000 motor vehicles and 450 fighter vehicles. Weekly our ammunition factories make 525,000 rounds of heavy ammunition and 25,000,000 rounds of small arms ammunition. Chemical plants each week turn out 10,000 tons of explosives and other chemicals.

"We have launched 500 ships and delivered 8000 aircraft, 475,000 motor vehicles and 24,000 fighting vehicles. We have delivered 55,000 heavy gun barrels or mountings and 630,000 small weapons. We have produced 800,000 tons of chemicals and explosives. Total dollar value of deliveries to date is over $4,500,000,000. Employment in war industry is estimated at more than 900,000 men and women."

The Dominion's steel industry has been doubled since the war began, he said, and now is fourth largest among the United Nations, exceeded only by the United States, Great Britain and Russia.

Transition in the production program, he said, is inevitable and "we have maintained a high degree of flexibility in planning production facilities, which now permits necessary changes with a minimum of inconvenience. Never again will there be any doubt that Canada can manufacture anything made elsewhere.

Shortage of manpower has developed, particularly in coal and base metal mining, forest industries and common labor for steel mills and allied industries and for construction work.

War Expenditures Outlined

Canada's war expenditure for the fiscal year ending March 31, 1944, will total $1,764,000,000, against estimated expenditures for the year immediately preceding of $1,060,508,000 Defense Minister Ralston stated in the House of Commons. Notwithstanding sharp curtailment in production of certain types of guns, ammunition and other war materials, intimated by Munitions Minister C. D. Howe, Mr. Ralston stated that major increases in expenditure for the current fiscal year will come under the categories of pay and allowances totaling $539,730,211 against $383,411,423; ammunition and bombs, $273,325,890 against $17,327,329; armament, including rifles, machine guns, mortars and guns of all descriptions, $123,070,907 against $63,832,169 and motor transport vehicles, including trucks, tractors, trailers, tanks, armored fighting vehicles and repair parts, $371,853,674 against, $272,206,108.

LEAD FOR UNITED NATIONS: Canada with the largest nonferrous smelter in the British Empire, is turning out 700 tons of lead a day for war uses. Above, molten lead is flowing into a pot where it is oxidized by forcing air through the base of the pot in a purification process to remove final traces of arsenic, tin and antimony. NEA photo

THE BUSINESS TREND

Strikes Stall Upswing; Industrial Indexes Off

INDEXES of industrial volume are moving toward lower ground. The upward progress of production has been interrupted temporarily by general labor unrest which reached the boiling point in the coal miners' strike and the government's effort to control this and other work stoppages affecting the war program.

Washington's delay and apparent confusion in formulating a tax program capable of checking inflation and uncertainties attending war production changes are factors tending to obscure the outlook.

Wave of strikes in automotive-aircraft and rubber industries, coming concurrently with the coal difficulty, prompted Congressional passage of the Smith-Connally anti-strike bill.

Although full effects of the coal strike may not be discernible for some time, it is readily seen that irreparable damage was done. Output of bituminous coal declined from 11,800,000 tons during the week ended May 29 to 3,050,000 tons for the period ended June 5. Production at this point was down 72.4 per cent from the comparable week last year . Early curtailment of rail freight movement was indicated, while steel output definitely suffered. In the following week a number of open-hearth furnaces went down for lack of coke-oven gas and threatened fuel shortage caused one large producer to bank 11 blast furnaces; in all about 13 stacks suspended.

Completion of the government's simplification program limiting size, style, ornamentation, etc., of hundreds of consumer articles in everyday use is promised before the year's end by WPB. About 500 items in addition to those civilian products already affected by war restrictions will be simplified to save manpower, materials and machines. The program is aimed at a further reduction in steel consumption of nearly 5,000,000 tons a year.

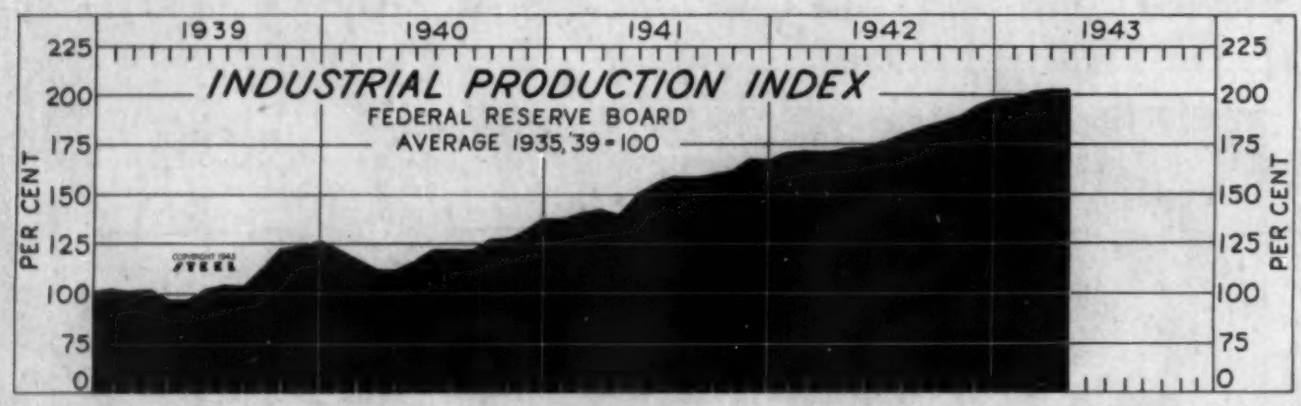
Throughout April and into the early part of May industrial activity made additional gains over the first three months of the year. Federal Reserve Board's index rose one point to 203 from March, due chiefly to higher levels of production in machinery and transportation equipment industries.

War expenditures during May amounted to $7,373,000,000, an increase of 1 per cent over April.

Daily rate of expenditures last month averaged $283.6 billions, against $280.4 for prior month and $147.1 for May, 1942.

Daily rate of spending has mounted steadily from the 1940 average of $12.5 billions, to $45.6 billions in 1941, rising to $169.1 billions last year.

Total disbursements from the beginning of the war effort to May 31 are $102,322,000,000.



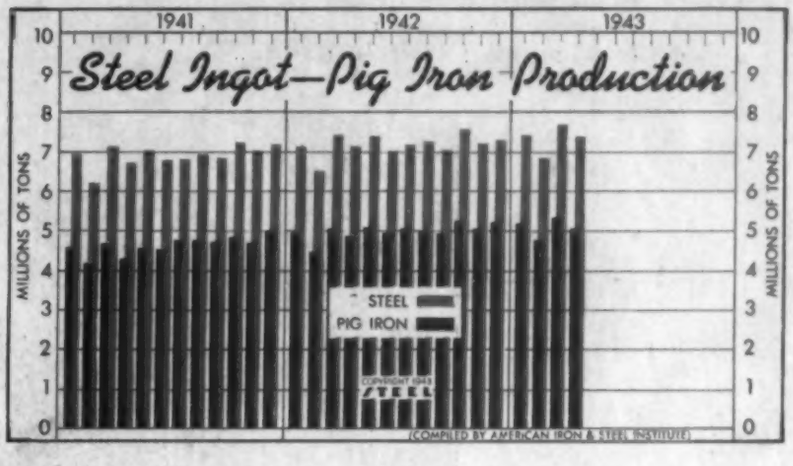
FIGURES THIS WEEK

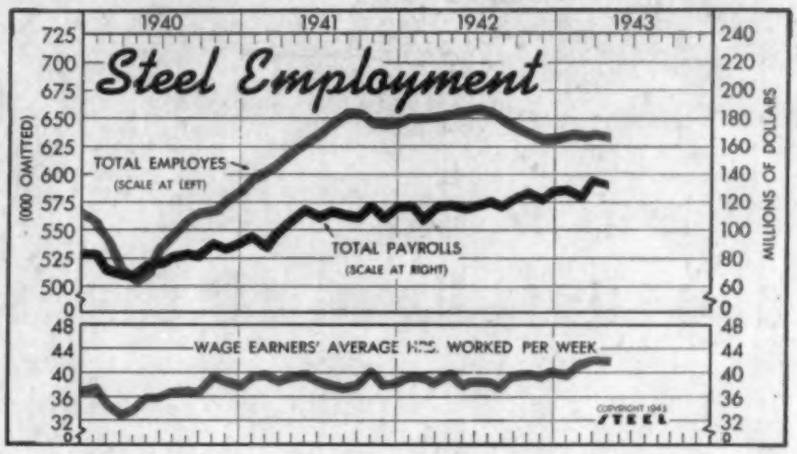
INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96.5	98.5	98.5	99.0
Electric Power Distributed (million kilowatts)	4,040	3,926	3,969	3,464
Bituminous Coal Production (daily av.—1000 tons)	508	1,967	2,025	1,888
Petroleum Production (daily av.—1000 bbls.)	3,988	3,933	3,984	3,684
Construction Volume (ENR—unit $1,000,000)	69.6	106.9	80.6	379.4
Automobile and Truck Output (Ward's, number)	19,065	17,215	19,675	22,300
*Dates on request.				
TRADE				
Freight Car Loadings (unit—1000 cars)	668	852	817	855
Business Failures (Dun & Bradstreet, number)	54	56	77	173
Money in Circulation (in millions of dollars)	$17,237	$17,196	$16,741	$12,176
Retail Sales (change from like week year ago)	+15%	+14%	+5%	+24%††
††Six months.				

Iron Steel Production

(Net tons—000 omitted)

	Steel Ingots		Pig Iron	
	1943	1942	1943	1942
Jan.	7,424	7,112	5,194	4,983
Feb.	6,826	6,512	4,766	4,500
Mar.	7,670	7,392	5,314	5,055
Apr.	7,374	7,122	5,035	4,896
May	7,545	7,382	.....	5,073
June	.....	7,022	.....	4,935
July	.....	7,148	.....	5,051
Aug.	.....	7,233	.....	5,009
Sept.	.....	7,067	.....	4,937
Oct.	.....	7,584	.....	5,236
Nov.	.....	7,184	.....	5,083
Dec.	.....	7,303	.....	5,201
Total	.....	86,061	.....	59,959





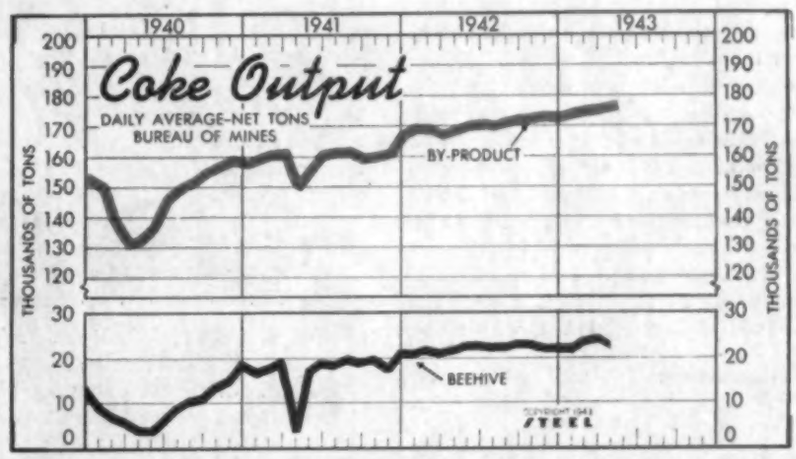
Steel Employment

	Employes—Number (000 omitted)		Total Payrolls (Unit—$1,000,000)	
	1943	1942	1943	1942
Jan.	637	651	129.7	118.8
Feb.	635	651	122.8	108.5
Mar.	637	653	136.8	117.0
Apr.	634	654	133.3	118.5
May	...	656	.....	117.4
June	...	659	.....	118.0
July	...	655	.....	120.7
Aug.	...	647	.....	118.7
Sept.	...	641	.....	124.8
Oct.	...	635	.....	126.6
Nov.	...	632	.....	122.8
Dec.	...	633	.....	129.3

Coke Output
Bureau of Mines

(Daily average—Net tons)

	By-Product		Beehive	
	1943	1942	1943	1942
Jan.	174,044	168,508	21,440	20,874
Feb.	175,107	168,414	23,991	21,771
Mar.	175,051	167,733	24,369	21,032
Apr.	175,857	168,960	22,932	21,843
May	.....	170,187	.....	22,571
June	.....	170,593	.....	22,487
July	.....	170,244	.....	22,197
Aug.	.....	171,443	.....	22,333
Sept.	.....	172,110	.....	23,106
Oct.	.....	172,211	.....	23,148
Nov.	.....	173,029	.....	22,106
Dec.	.....	173,163	.....	22,000
Average	.....	170,549	.....	22,122



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet, total in billions)	$8,123	$7,769	$9,215	$6,382
Federal Gross Debt (in billions of dollars)	140.4	140.0	138.2	74.8
Bond Volume, NYSE (millions of dollars)	53.2	41.8	78.9	28.4
Stock Sales, NYSE (thousands of shares)	5,263	5,736	9,033	1,668
Loans and Investments (in millions)†	$47,182	$47,068	$46,108	$31,679
United States Gov't. Obligations Held (in millions)†	32,467	32,275	30,496	14,559

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)††	245.3	246.1	243.7	228.0
Industrial Raw Materials (Bureau of Labor index)†	114.1	114.3	112.7	100.4
Manufactured Products (Bureau of Labor index)†	100.9	100.9	100.9	98.9

†† 1931 = 100. † 1926 = 100.

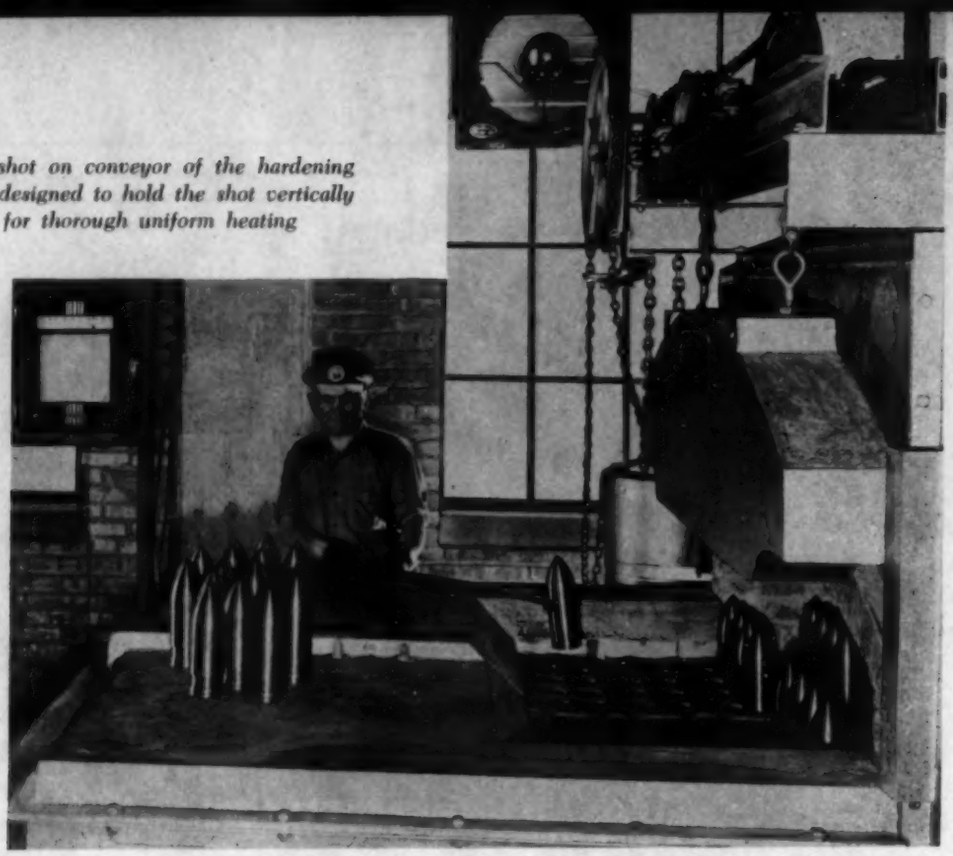


Fig. 1—Operator placing shot on conveyor of the hardening furnace. This conveyor is designed to hold the shot vertically and spaced properly for thorough uniform heating

Heat Treatment of . . . .

SOLID A.P. and S.A.P. SHOT

MUCH has been done, but little recorded, on the heat treatment of solid shot, both armor-piercing (A.P.) and semi-armor-piercing (S.A.P.), now holding such an important position in our munitions program. Solid shot have been constructed in two ways—the one-piece type and the three-piece type. The latter is preferred today, as it makes possible a shatter-proof body with stresses relieved by separate treatment, also a softer base resulting from the draw-back, and a hard nose capable of penetrating protective armor plate. Decremental hardening may be employed in the salt bath method of heat treatment, with stresses relieved following hardening.

To cite an actual installation, one concern machines 37-millimeter A.P. shot and then sends them to the heat treat where they are partially immersed in a bath of Houghton's Liquid Heat. This installation is arranged on a production line, with fixtures so rigid that the shot are immersed to within about $\frac{5}{8}$-inch of the band seat. This leaves the shot hard at the nose and soft ahead of the band seat.

The heating furnace, quench tank and draw furnace, manufactured by Johnston Mfg. Co., are operated as a continuous unit system. The pot is 36-inches in diameter and 24-inches deep. This unit is shown in Fig. 3.

In the quench tank are 400 gallons of Houghton's quenching oil, circulated for

From information furnished by E. F. Houghton & Co., Philadelphia.

Fig. 2. (Left, below)—As the shot reach end of the hardening furnace, operators use tongs to remove them from furnace and place them nose down in the cages of the conveyor which carries them through the quench

Fig. 3. (Right)—Continuous salt-bath furnace for 37-millimeter shot. Note motor and gear drive on top frame for rotating fixtures in which the shot are placed. Cover with opening just large enough for loading and unloading operations conserves heat, shields operators, prevents drafts from striking work

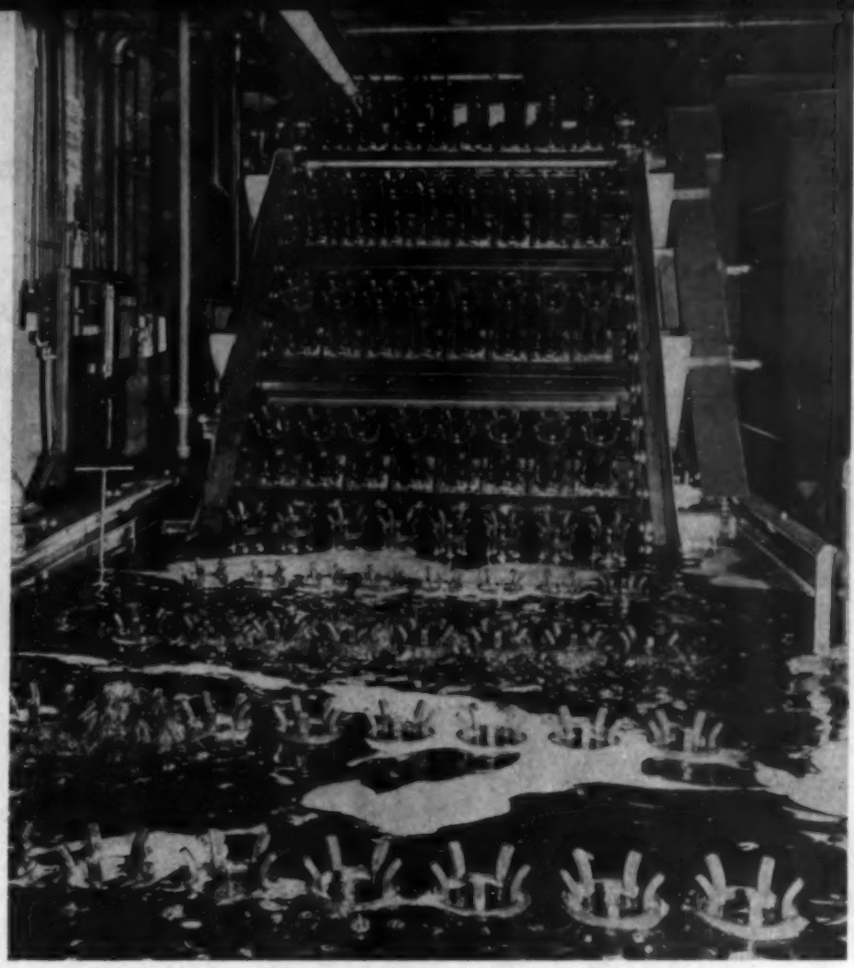


Fig. 4—Closeup of quench conveyor showing rows of cages in which the shot are placed. First four rows are over jets of oil, last two are still-cooled. Conveyor automatically carries shot up out of quench and feeds them to air draw furnace by gravity

cooling over pipe coils containing 70 degrees Fahr. city water. The draw furnace is 15-feet long and 2-feet wide. Both furnaces are gas fired. The shot are quenched in Houghton's oil, being set in fixtures and oil forced around them under pressure of 20 to 30 pounds per square inch.

Next the shot are run through a warm water spray, cleaning the oil and bath solution readily from the metal. It is not necessary to use alkaline cleaning in this instance. The shot are then drawn in air and allowed to cool.

To test them, a "shock" method is used, requiring a continuous system through three tanks. The first contains water maintained at 44 degrees Fahr. After 15 minutes in this tank to chill the work, it goes to the second tank in which water is held at 212 degrees Fahr., then after a 25-minute immersion, to a third tank cooled to 44 degrees Fahr. again. After 40 minutes in this third tank the shot are inspected. Rejections are said to run less than 4 per cent.

To prove the uniformity and freedom from distortion of this method, it is stated that shot may be hardened and quenched without subsequent machining or even grinding.

Machining Shot: The machining of these shot is done with the aid of a Houghton Cut-Max base which is high in saponifiables and sulphur, and which contains an E.P. additive. This base is cut 10 to 1 with a 100 degrees blending oil.

Another type of heat treatment of shot is the reducing atmosphere method of dry heating in continuous production. Details of this have been provided by Chicago Flexible Shaft Co., builders of the furnaces used on the installation described.

Here 75-millimeter A.P. shot after rough machining are placed in a heat-resisting alloy conveyor in recesses holding individual shot, standing on their base as shown in Fig. 1.

The conveyor, conveyor shafts and drive sprockets are made of 35:15 nickel-chromium alloy for maximum heat resistance. The conveyor is driven by a standard electric motor, operated through a speed reducer and variable speed transmission for positive control of operating time cycle.

The hardening furnace is fired with either gas or oil fuel. Burners are placed along the side of the furnace, overfiring along the arch, down along the opposite side wall, underneath the conveyor, exhausting through flues placed at floor level. This assures maximum circulation of hot gases and uniform heating of the shot.

The temperatures are controlled in three zones. The first consists of about 10 to 14 per cent of the burner capacity, and is controlled manually. The second zone, comprising about 40 to 45 per cent of the burner capacity, brings the shot up to the correct heating temperature, and is controlled by an indicating controller and proportioning valve. The third, or soaking zone, is controlled by a recording controller operating through the same type of valve and motor as the second zone. Two-position motors are used. Air for combustion is supplied by turbo type blowers.

Shot are unloaded from the furnace manually. The operators take the shot through the doors of the unloading ports with tongs and transfer it to the quench tank as shown in Fig. 2.

The Quench: After hardening, quenching is the next important step in the heat treating of A.P. shot. By the method under discussion each shot goes into an individual quenching cage, point down, directly over a jet of quenching oil at the correct temperature and 30 to 35 pounds pressure per square inch.

These quenching cages are mounted in

(*Please turn to Page* 125)

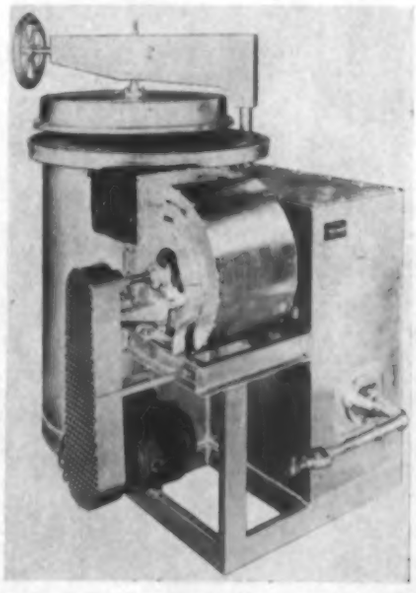
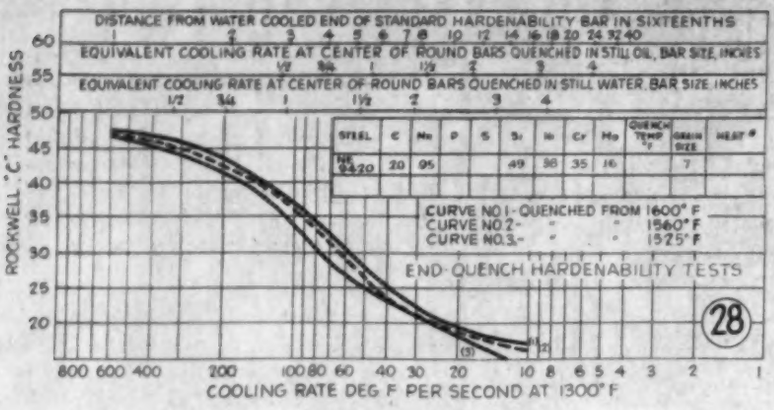
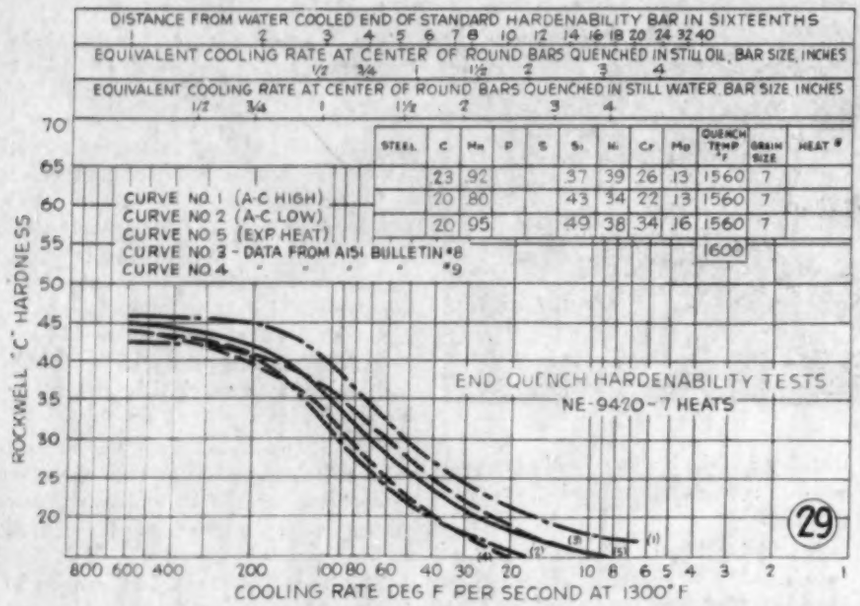


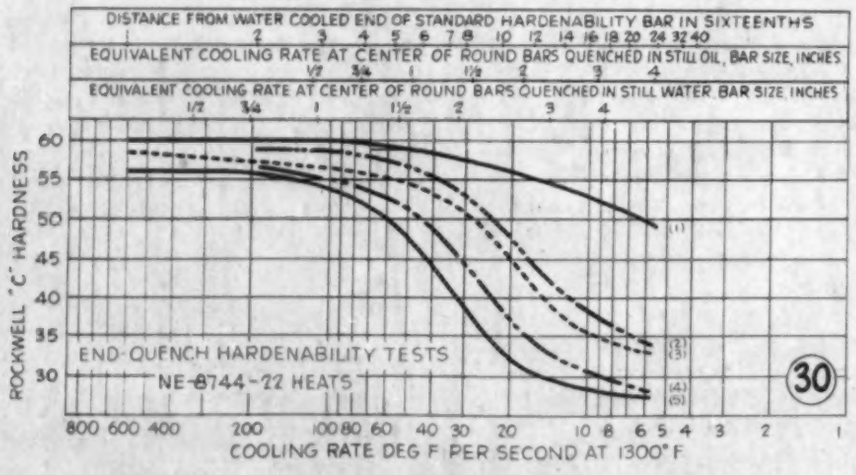
Fig. 5—Small basket type draw furnace used for heat treating A. P. shot

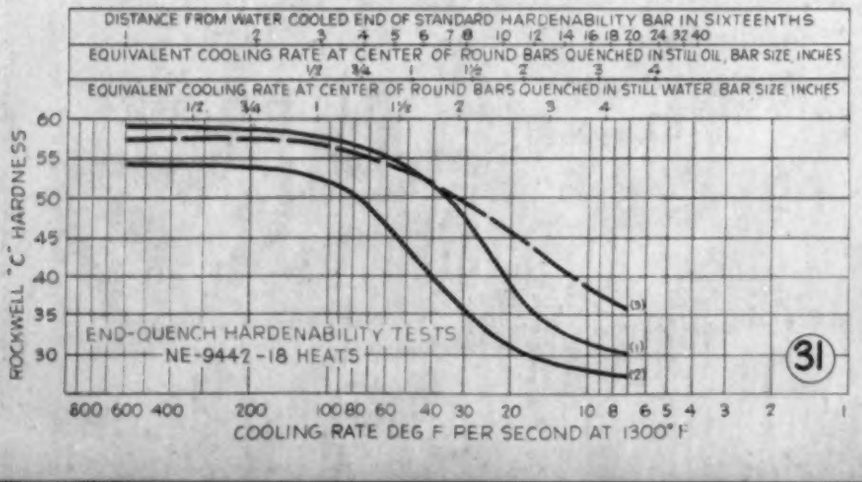
THE LUNDBYE PROCESS

The second part of the Lundbye article, originally scheduled for this week, does not appear in this issue. It is being scheduled for the issue of June 28.


DISTANCE FROM WATER COOLED END OF STANDARD HARDENABILITY BAR IN SIXTEENTHS
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL OIL, BAR SIZE, INCHES
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL WATER, BAR SIZE, INCHES
ROCKWELL "C" HARDNESS
STEEL C Mn P S Si Ni Cr Mo QUENCH TEMP °F GRAIN SIZE HEAT #
NE 9420 .20 .95 .49 .38 .35 .16 7
CURVE NO 1 - QUENCHED FROM 1600° F
CURVE NO 2 - " " 1560° F
CURVE NO 3 - " " 1525° F
END-QUENCH HARDENABILITY TESTS
28
COOLING RATE DEG F PER SECOND AT 1300° F


DISTANCE FROM WATER COOLED END OF STANDARD HARDENABILITY BAR IN SIXTEENTHS
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL OIL, BAR SIZE, INCHES
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL WATER, BAR SIZE, INCHES
ROCKWELL "C" HARDNESS
STEEL C Mn P S Si Ni Cr Mo QUENCH TEMP °F GRAIN SIZE HEAT #
CURVE NO 1 (A-C HIGH) .23 .92 .37 .39 .26 .13 1560 7
CURVE NO 2 (A-C LOW) .20 .80 .43 .34 .22 .13 1560 7
CURVE NO 5 (EXP HEAT) .20 .95 .49 .38 .34 .16 1560 7
CURVE NO 3 - DATA FROM AISI BULLETIN #8 1600
CURVE NO 4 " " " " #9
END-QUENCH HARDENABILITY TESTS
NE-9420 - 7 HEATS
29
COOLING RATE DEG F PER SECOND AT 1300° F


DISTANCE FROM WATER COOLED END OF STANDARD HARDENABILITY BAR IN SIXTEENTHS
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL OIL, BAR SIZE, INCHES
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL WATER, BAR SIZE, INCHES
ROCKWELL "C" HARDNESS
END-QUENCH HARDENABILITY TESTS
NE-8744 - 22 HEATS
30
COOLING RATE DEG F PER SECOND AT 1300° F


DISTANCE FROM WATER COOLED END OF STANDARD HARDENABILITY BAR IN SIXTEENTHS
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL OIL, BAR SIZE, INCHES
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL WATER, BAR SIZE, INCHES
ROCKWELL "C" HARDNESS
END-QUENCH HARDENABILITY TESTS
NE-9442 - 18 HEATS
31
COOLING RATE DEG F PER SECOND AT 1300° F

User Report No. 14 on NE (National Emergency)

By FREDERICK HORAK
And
EUGENE CHAMPLIN
Metallurgists
Allis-Chalmers Mfg. Co.
Milwaukee

(Concluded from Last Week)

JOMINY hardenability curves for NE-9420 are shown in Fig. 28. Maximum hardness of the core on reheating is obtained at quenching temperatures of 1560 to 1600 degrees Fahr. Fig. 29 exhibits the probable hardenability band of NE-9420 for seven heats tested. It will be noted that the hardenability of the experimental heat tested cuts the center of this band.

Chemical analysis and physical properties are given in Table V.

NE-9420 has much better ductility than the higher carbon NE-9422 and NE-9430 grades and thus was considered a better substitute. The strength is somewhat below that for NE-8620 and SAE-4620 and, therefore, the practice so far has been to fabricate only smaller, less-stressed gears from this material.

NE-8744: Jominy hardenability curves for NE-8744 are shown in Fig. 30. It will be noted that the test results shown here are from a heat whose hardenabil-

For information on development of NE steels and their properties, see STEEL, *Feb. 9, 1942, p. 70; March 16, p. 72; June 8, p. 66; June 15, p. 66; July 13, p. 80; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41 and 76; Sept. 7, p. 78; Oct. 19, p. 66; Nov. 9, p. 96; Dec. 28, p. 27; Jan. 25, 1943, p. 84; Feb. 22, p. 102; March 1, p. 94; March 8, p. 90; March 22, p. 78; March 29, p. 76; April 5, p. 116 and 118.*

For reports from users of NE steels, see Nov. 16, 1942, p. 106; Nov. 23, p. 90; Nov. 30, p. 62; Dec. 7, p. 112; Dec. 14, p. 99; Dec. 21, p. 70; Jan. 11 1943, p. 60; Jan. 18, p. 66; Feb. 1, p. 100; March 8, p. 109; March 15, p. 96; March 29, p. 72; April 26, p. 84.

For latest revised listing of NE ALLOY steels, see March 1, p. 98.

For list of NE CARBON steels, see March 8, p. 90.

For list of AMS (Aeronautical Materials Specifications) steels, see Sept. 7, 1942, p. 78.

For details of WD (War Department) steels and complete listing, see Feb. 8, 1943, p. 80.

For STEEL*'s latest* Handbook on NE Steels *and the* NE Steel Selector, *address Readers' Service department, Penton building, Cleveland. Price* $1.00 *per set.*

ALLOY STEELS

Concluding details of their experience with 85 heats of NE steels, Allis-Chalmers metallurgists here present results of their work with NE-9420, NE-8744, NE-9445 and NE-9462

ity cuts the center of the band. Chemical analysis and physical properties are in Table VI.

This preliminary test (Table VI) of NE-8744 steel showed it to have superior physical properties over SAE-4140 and SAE-3140. Subsequent data published by Republic Steel Corp. upheld this fact and the changeover was made.

NE-9445: The Jominy hardenability curve for the NE-9445 steel tested along with the probable hardenability band for NE-9442 is shown in Fig. 31. Table VII gives chemical analysis and physical property tests.

Referring to Fig. 31, it will be noted that the only appreciable difference between NE-9442 and NE-9445 is the carbon content. The lower carbon in NE-9442 is accompanied by a drop in hardenability for larger sections. This, of course, should be expected.

As a result of the above tests, substitution of NE-9442 and NE-9445 for NE-8744 was made with little trouble. To date we have made a number of spline shafts of NE-9442 and 9445 which formerly called for SAE-3140, SAE-4140 or NE-8744. No serious machining or heat-treating difficulties have been encountered thus far on these steels at hardnesses of 269 to 321 and 360 to 418 brinell. In general, NE-8642, 8645, 8640, 9445 and 9442 hot-rolled bar stock are common substitutes for SAE-3140 and SAE-4140.

NE-9642: Jominy hardenability curves for one experimental heat of NE-9642 steel are shown in Fig. 32 with chemical analysis and results of physical property tests in Table VIII.

This steel appears to have good possibilities for small sections. However, as yet no NE-9640 or NE-9642 has been received in production lots and our data is limited to the above heat in Table VIII.

Because of the scrap situation, it has been our plan to standardize more on the NE-9400 series in that no virgin alloys must be used, better control of residual alloys is maintained, and they appear to be more readily available.

Figs. 33, 34 and 35 illustrate some of

TABLE V—Chemical Analysis and Properties of NE-9420

	C	Mn	Si	Cr	Ni	Mo	Grain size
NE-9420	.20	.95	.49	.35	.38	.16	7

Physical Properties

Treatment: Pseudo-carburized—1700°F.—8 hours
Reheated to 1560 F.—oil quench—Drawn 400°F.—3 hrs.

Grade	Size Treated	Textile Strength PSI	Yield Point PSI	% Elong. in 2"	% Red Area	Keyhole Charpy Impact ft. lbs.	Breaking Temperature
NE-9420	½" Rd.	154,000	90,200	14	54		
	1" Rd.	119,200	85,000	23	58	39	75°F.
				—	—	31	—20°F.

Fig. 28—End-quench hardenability curves from tests of NE-9420

Fig. 29—End-quench hardenability curves from tests of NE-9420 and comparison with standard curves

Fig. 30—Results of testing 22 heats of NE-8744 for end-quench hardenability:

	C	Mn	Ni	Cr	Mo	Grain Size	Quench Temp. °F.
Curve 1 (A-C tests, high)	.48	.90	.55	.55	.26	7-8	1525
Curve 2 (AISI data, high)	.44	.92	.68	.58	.26	6	1550
Curve 3 (Exp. heat)	.41	.97	.54	.53	.26	7-8	1525
Curve 4 (AISI data, low)	.40	.81	.50	.50	.23	8	1500
Curve 5 (A-C tests, low)	.44	.73	.46	.46	.23	7-8	1525

Fig. 31—Results of testing 18 heats of NE-9442 for end-quench hardenability:

	C	Mn	Si	Ni	Cr	Mo	Grain Size	Quench Temp. °F.
Curve 1, NE-9442 high	.44	1.12	.44	.30	.34	.13	Fine	1525
Curve 2, NE-9442 low	.42	.88	.45	.39	.28	.17	6	1525
Curve 3, NE-9445 (single heat)	.48	1.13	.46	.35	.37	.15	Fine	1500

Fig. 32—End-quench hardenability tests on NE-9642

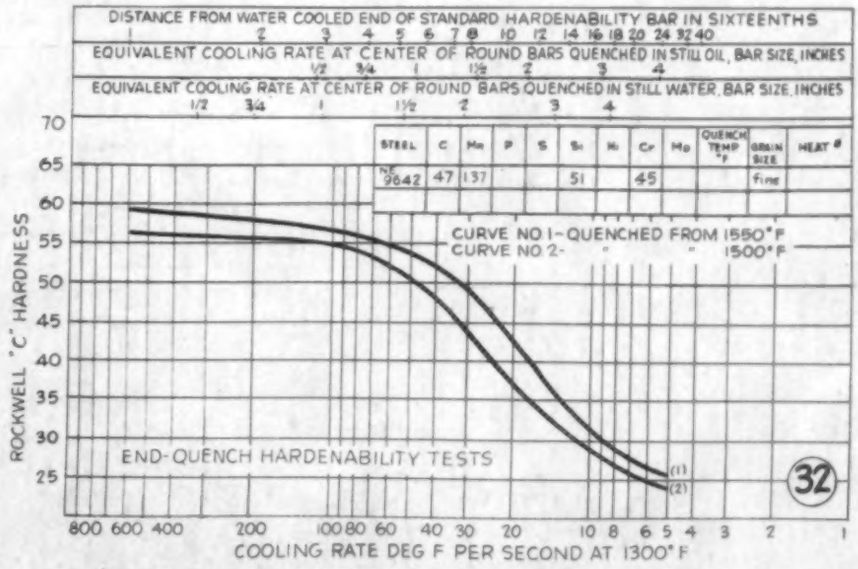
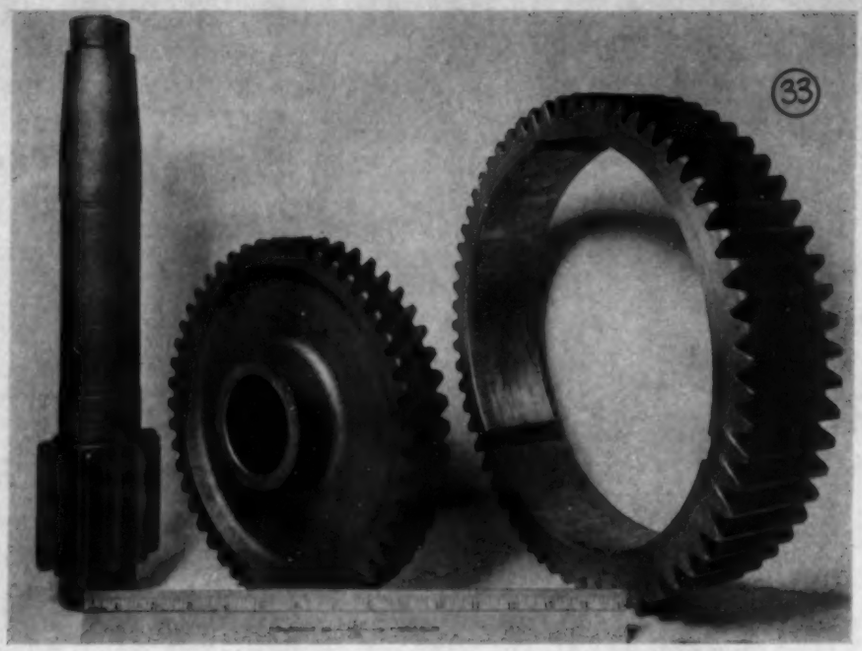

DISTANCE FROM WATER COOLED END OF STANDARD HARDENABILITY BAR IN SIXTEENTHS
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL OIL, BAR SIZE, INCHES
EQUIVALENT COOLING RATE AT CENTER OF ROUND BARS QUENCHED IN STILL WATER, BAR SIZE, INCHES
STEEL C Mn P S Si Ni Cr Mo QUENCH TEMP °F GRAIN SIZE HEAT #
NE 9642 .47 1.37 .51 .45 Fine
CURVE NO 1 - QUENCHED FROM 1550°F
CURVE NO 2 - " " 1500°F
END-QUENCH HARDENABILITY TESTS
32
ROCKWELL "C" HARDNESS
COOLING RATE DEG F PER SECOND AT 1300° F

Fig. 33—Typical examples of gears and pinions of NE-8720 steel

Fig. 34—The two gears on left are made from NE-9420 while the two at the right are of NE-8620

Fig. 35—Typical applications of NE-9445 and NE-9442 for pinions and shafting

the parts being made of NE steels at the present time.



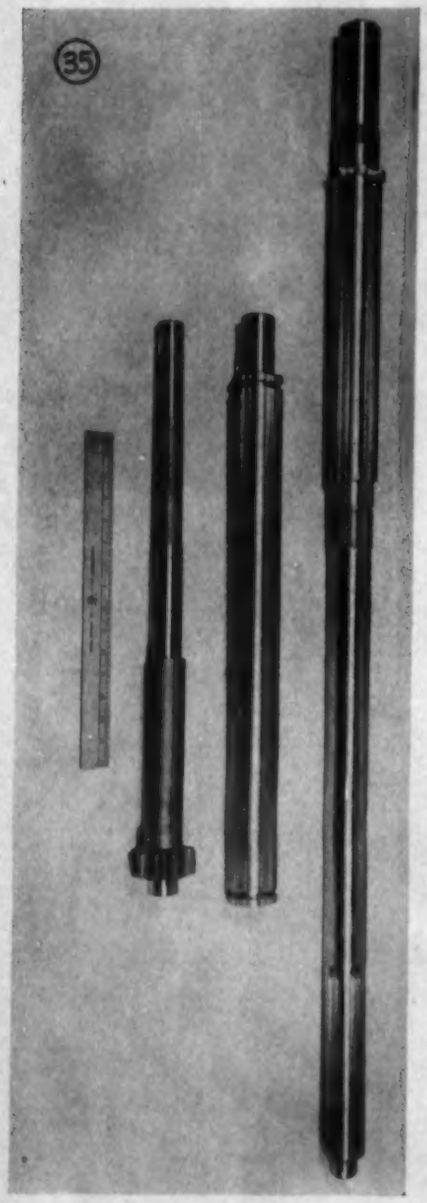


TABLE VI—Chemical Analysis and Properties of NE-8744, Comparison

	C	Mn	Cr	Ni	Mo	Grain Size
NE-8744	.41	.97	.53	.54	.26	7-8

Physical Properties

Treatment: NE-8744—Oil quench 1525°F, drawn 900°F—1 hour.
SAE-4140—Data from SAE Handbook—900°F. Draw.
SAE-3140—Data from SAE Handbook—900°F Draw.

Grade	Size Treated	Textile Strength PSI	Yield Point PSI	% Elong. in 2"	% Red Area	Keyhole Charpy Impact ft. lbs.	Breaking Temperature
NE-8744	1" Rd.	179,250	165,500	15	57	25	75°F.
NE-8744						22½	—20°F.
SAE-4140	1" Rd.	170,000	145,000	11	40	——	——
SAE-3140	1" Rd.	156,000	133,000	15	50	——	——

TABLE VII—Chemical Analysis and Properties NE-9445

	C	Mn	Si	Ni	Cr	Mo	Grain Size
NE-9445	.48	1.13	.46	.35	.37	.15	7

Physical Properties

Treatment: Oil quench 1500°F, Drawn as shown below.

Grade	Size Treated	Draw Temp.	Draw Time	Tensile Strength PSI	Yield Point PSI	% Elong. in 2"	% Red Area
NE-9445	1" Rd.	900°F.	1 hr.	189,000	176,700	13	36
	1" Rd.	1100°F	1 hr.	146,000	130,500	17½	44
	1½" Rd.	1100°F.	1½ hr.	139,500	117,500	18½	45
	1¾" Rd.	1100°F.	2 hr.	131,750	104,500	19	50

Keyhole Charpy Impact Properties

Treated as .394" square bar
Treatment: Heated to 1500°F.—oil quench—Drawn at 1100°F.—1 hr.

Grade	Rockwell C Hardness	Charpy Impact	Breaking Temperature
NE-9445	34—36	21—23	75°F.
	33—34	22—25	— 20°F.

TABLE VIII—Chemical Analysis and Properties NE-9642

	C	Mn	Si	Cr
NE-9642	.47	1.37	.51	.45

Physical Properties

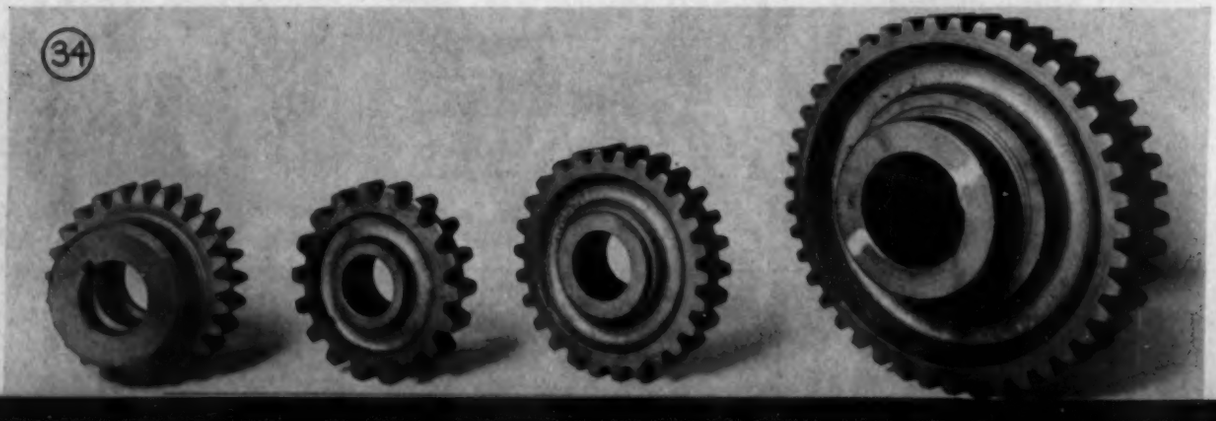
Treatment: Oil quenched from 1550°F.—Drawn as shown below

Grade	Size Treated	Draw Temp.	Draw Time	Tensile Strength PSI	Yield Point PSI	% Elong. in 2"	% Red Area
NE-9642	1" Rd.	900°F.	1 hr.	172,000	158,500	13	41
	1" Rd.	1100°F.	1 hr.	141,500	128,750	18½	51

Keyhole Charpy Impact Properties

Treated as .394" Square Bars
Treatment: Heated to 1550°F, oil quench—Drawn at 900 F—1 hr.

Grade	Rockwell C Hardness	Charpy Impact	Breaking Temperature
NE-9642	40—42	17—20	75°F.
	39—40	16½—17½	—20°F.



An air-minded world waits for wings

BECAUSE of the airplane, the peace to come can be as global as the war. Trade and transportation will move freely to peoples never before a part of the world's markets. Millions to whom modern life is unknown have already met and understood the airplane. Like all of us, they will welcome its cargoes.

Such an opportunity can help maintain a war-size aircraft industry. The largest warplanes, the speediest bombers, may be inadequate for coming needs of passengers, mail, air express and freight.

The air industry can plan for an era of conversion and new production with a freedom in one way unknown. Materials will be available in almost endless quantity and variety. Revere alone will be ready with all forms of copper, as well as with gifted new alloys. But which metal should be used for what? The choice may not be easy.

For impartial answers to questions about metals, industry can turn to Revere. For just as industry in the future will not be restricted to the traditional materials, neither will Revere. Since the start of the war, in addition to widening still further the uses for copper and its alloys, Revere has developed facilities for manufacture of the light metals, and is pioneering in the production of wholly new alloys that can cut manufacturing costs for many industries.

Today the copper industry is producing all-out for war. No copper is available for any other use. But post-war planners with specific problems in metals are referred directly to the Revere Executive Offices in New York.

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HOW TO UTILIZE MOST EFFECTIVELY THE . . . .

flame cutting

OF PARTS FOR ARC WELDING

Fig. 1—Shaded portions of this all-welded earthmover were flame cut. Note how they outline the form of the machine

WITHOUT the process of flame cutting steel on a mass production basis, the use of arc welding for large volume fabrication of machinery and equipment as we know it today could hardly have developed. Quality of workmanship and degree of accuracy of the flame cutting play an important part in the final appearance of the unit. They also have a significant bearing on the cost. Let's examine the factors involved.

In the first place, almost all modern arc welded machinery receives the general shape of its outline from the flame cut parts, as is illustrated in Fig. 1 which shows the main body structure of a modern all-welded earthmoving machine. The black parts in this phantom view are those produced by flame cutting. As may be seen, they form the major portion of the unit.

A high degree of accuracy and good workmanship are required to make a smooth appearing outline and a machine which will finish with symmetrical lines, unblemished by defects in the cutting. For this reason it is important to control the mechanics of the flame-cutting process, as well as the overall accuracy of the shaping of the part.

The second important factor, that of cost of the completed unit, is considerably affected by accuracy and workmanship in flame cutting. If the edges do not come together in proper relationship when assembling the structure, there is always a heavy expense in additional work of cutting the parts to fit at the time of set up or the expensive alternative of filling up the gaps with weld metal. A gap equivalent to half the thickness of the thinnest plate in the average welded joint will increase the time required to fill the gap with weld metal to well over 250 per cent of the time required with good fit-up.

In addition to the lost time and the additional welding electrodes consumed, there is almost always additional distortion of the structure caused by the greater concentration of heat in the locality where the gap was filled up by several additional passes of welding metal. Frequently grain growth or burning of the metal in the locality may also seriously weaken the finished structure.

By means of careful control and thor-

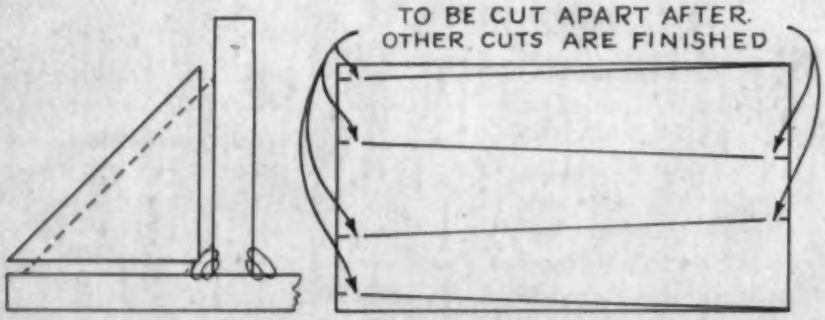


Fig. 2. (Left, above)—Notice fitup problem caused when corner is left on a gusset that fits up to a weld (solid lines). Compare with ease of fitup when corner is cut off as shown by dotted lines

Fig. 3. (Right)—By leaving long narrow strips "tacked" together, by skipping a fraction of an inch of cut as shown here, and then cutting them apart after the last long cut has been completed, sidewise distortion is held to a negligible quantity

CARBIDE TOOL

Service Beyond the Sale!

TO HELP FURTHER INCREASE WAR PRODUCTION

★ CARBIDE TOOL TRAINING COURSE

To help carbide users in war industries speed the training of new men, apprentices, and those being converted to carbide tool use in the metal working trades, Carboloy Company operates an instruction course at its Detroit plant for the training of carbide users' key men. These men receive one week's training in the fundamentals of design, brazing, application and maintenance of carbide tools, through actual shop practice, discussion periods, and training film showings. The men return to their own plants with a basic knowledge of carbide practice—and recommended procedure for training their own men, assisted, when desired, by our field engineers.

During the two years in which this training course has operated, carbide users in 39 states and 3 allied countries have received this training. The course is operated without charge as a service to war industries. A similar service is available to cartridge case die users—to instruct in the finishing and servicing of carbide dies for drawing cartridge cases.

★ FIELD SERVICE

Since the day cemented carbide was first introduced—as a new, strange, "revolutionary" tool material—Carboloy has maintained a large, active staff of experienced field engineers to assist users in all phases of carbide tool practice. As an example of the type of service these men render, in one year alone they trained more than 5,000 men in users' plants in the correct methods of rapid carbide tool grinding.

★ SPECIALLY DEVELOPED GRINDING EQUIPMENT

Special carbide grinding equipment developed by Carboloy Company in cooperation with machine builders, plus special rapid grinding technique, conserves carbides, reduces down time on thousands of vital war jobs. (Cat. GT-141.)

★ NEW CHIP BREAKER GRINDER

New!—Improved type of grinder for grinding chip breakers in carbide steel cutting tools, including roller turner tools. Sturdier, larger table, high and low speed table travel. Also adaptable to grinding precision boring tools and flat form tools. (Left.)

★ TRAINING FILMS

To help in the gigantic task placed upon industry and government, of training new thousands of workers, a set of six carbide training films—as described below—was made available by Carboloy to industry last fall—to provide detailed training in all phases of carbide tool use. (Booklet GT-151.)

Film—"WHAT IS CEMENTED CARBIDE?"
Film—"DESIGNING CARBOLOY TOOLS"
Film—"BRAZING CARBOLOY TOOLS"
Film—"CHIP BREAKERS"
Film—"GRINDING CARBOLOY TOOLS'
Film—"PUTTING CARBOLOY TOOLS TO WORK"

These six films are available at approximate print cost

★ RESEARCH AND DEVELOPMENT

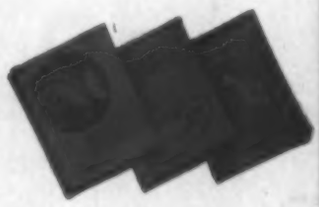
A special committee on research and development functions at Carboloy to constantly improve present methods and develop new methods, new materials for the future. The work of the men on this committee—headed by Dr. Zay Jeffries, metallurgist and Chairman of the Board of Directors of Carboloy Company—has resulted in many outstanding contributions now helping to further speed war production through carbide usage. This committee will continue its efforts to advance the art in the days of peace as well.

★ ENGINEERING ARTICLES IN THE TECHNICAL PRESS

Through frequent articles in technical magazines Carboloy engineers disseminate information on current phases of carbide use important to war industries. Milling with carbides, machining cast armor plate, renewing worn high speed steel tools, are a few of the many subjects covered in the past 12 months.

★ INSTRUCTIONAL LITERATURE

Each year Carboloy publishes comprehensive engineering bulletins covering latest carbide practice. Current booklets include D-113-R—finishing and servicing cartridge case dies—GT-133—carbide tool manual of design, brazing, grinding, application—GT-127—grinding carbide end cutting tools.



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TOOLS • DIES • DRESSERS • MASONRY DRILLS • WEAR RESISTANT PARTS

ough workmanship, parts may be cut mechanically or by hand with the flame-cutting process to an extremely high degree of accuracy. One of the most important factors in accurate cutting is that of completely laying out and studying each part and its relationship to other parts. Gussets or reinforcements, such as shown in Fig. 2, and bearing blocks set into box structures of welded construction should be studied with special care in order to get the corners cut to fit the contours of welds or other slight irregularities in the place where the parts will have to go.

Note how the three-cornered gusset in Fig. 2 sets up to the weld without gap *if the corner is properly bevelled*. The corner has been removed so the part will fit the contour of a weld (or a natural fillet in the structural shape of the part) against which the gusset or block fits. This saves cutting the corner off to fit as the structure is assembled. These rounded or bevelled corners and other small but highly important details of the shaping of the parts by flame cutting can easily be built into the original templet. It is easy to design a part so it can be made to exactly fit its final place in the assembly without further cutting or fitting at the time of set up for welding.

Control of Equipment, Materials and Process: General observations should be made about the care and use of the mechanical devices used for flame cutting in order to assure good workmanship and efficient operation.

Probably first among these is that the units, whether they be hand-operated cutting torches or mechanical flame-cutting machines, should be clean. The operating parts should be made to work smoothly by cleaning and proper lubrication; all valves, driving mechanisms, and the like should be free of irregularities, dirt or maladjustments which may interfere with the smoothest possible operation. Any slight irregularity in the operation of the machine, whether it is the opening of a valve, or the uniformity of speed of travel, will cause a defect in the parts being cut. Careful servicing and regular careful cleaning of the machine by those who operate it will go a long way toward assuring good, high-grade workmanship in the flame cut parts.

Selection of the proper tip for the cutting of any certain part and the correct cleaning and use of the tip, also has an extremely important bearing on the width of the kerf, the contour of the flame-cut surface, and the cutting speed. Almost all major producers of flame-cutting equipment have bulletins with specific directions and diagrams which describe the proper selection, the correct use, and the most effective means of cleaning flame-cutting torch tips. Such bulletins should always be carefully studied and followed.

Another really important matter of control, both from the standpoint of initial costs and materials as well as speed and efficiency is proper regulation of the oxygen and acetylene.

The amount of oxygen used in flame cutting, especially on heavy materials, constitutes a major raw material cost. It is not uncommon to find oxygen pressures of 60 or 70 pounds per square inch, or even more, being used. Often the flame-cutting operations would produce a better quality of cut and operate at a higher speed if the pressure were reduced to 30 or 40 pounds per square inch. In addition, it is easier to remove slag from cuts made with lower pressures.

One effective means for controlling the pressure in the large mass-production flame-cutting operations is to have a single manifold from which the oxygen is distributed to the various cutting operations. Then feed this manifold through a single valve which will automatically regulate the pressure to the desired number of pounds per square inch. Pressure is then beyond the control of the individual machine operator. Such automatic valves can be set properly by the foreman to meet the requirements of the job, and are then not subject to individual adjustment or the possibility of getting out of adjustment.

If the primary source of oxygen is thus cut to a pressure of 30 or 40 pounds per square inch and automatically maintained at that figure, it will eliminate

(*Please turn to Page* 127)

Fig. 4. (Upper view) — Three types of templets for mass production flame cutting operations. The large one at left is cardboard and is used to "trace" cuts with a multiple flame cutting machine where from 10 to 30 or 40 pieces are wanted. Upper right is for large numbers of pieces, mechanically cut. Lower right is special metal templet for hand cutting

Fig. 5. (Lower view)—Templets used by machines such as these must be accurate in size and form for consistent production of cut parts on a quantity basis

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1

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The plan provides a practical means of making a periodic, systematic analysis of circuits and equipment. Uncovers potential weaknesses . . . suggests ways to correct them . . . prevents overloading of lines. Your own maintenance staff or electrical contractor can readily put the plan into operation.

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APPROVED "CLIPPING"

—attains 80 per cent of rope strength in the clip fastening

—does not weaken rope or mis-shape it

By F. L. SPANGLER
Mechanical Engineer

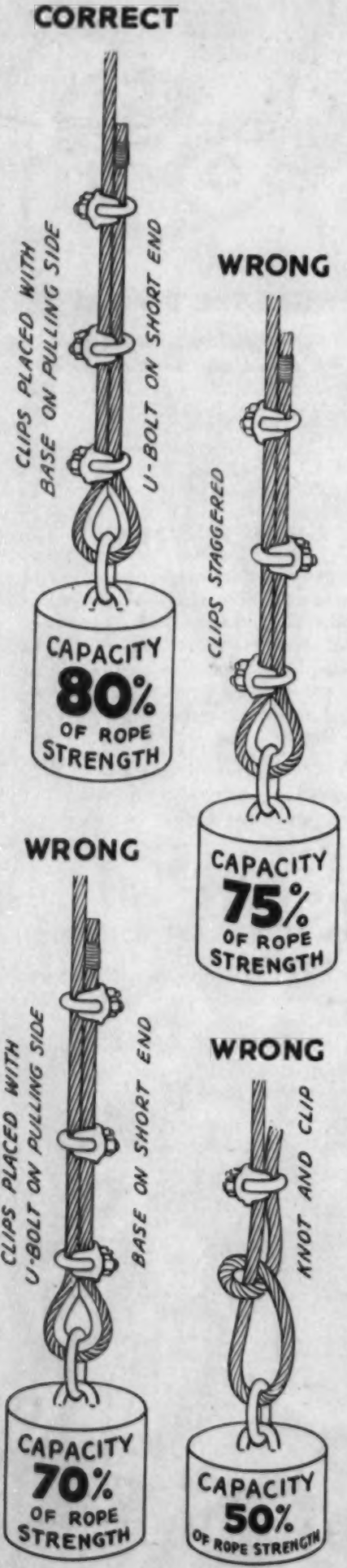


Fig. 1. (Left)—This diagrammatically illustrates how efficiency of clip fastenings is reduced by incorrect application of clips or by bad design

Fig. 2. (Right)—WRONG: Just about every possible error that could be made has been afflicted upon the wire rope in this illustration of how not to apply clips

THE CLIP fastening shown in Fig. 2 is materially weakened because of the way the clips have been applied to the wire rope. Unfortunately, it is no worse than hundreds of other clip fastenings made by rope handlers who are either careless or just don't know any better. And in these days when replacements of wire rope or other equipment are hard to get and machine shutdowns are more costly than ever before in all history, clips are mighty important.

What's wrong with this application? 1—The clips are staggered instead of all being applied with the base, or saddle, against the pulling rope and the U-bolt against the short end. 2—The short end between the two top clips is slack and can't take any of the load; hence, the top clip is useless, and we have the equivalent of only a three-clip fastening. 3—The bolts on the top clip have obviously been drawn too tight, thereby mis-shaping and weakening the rope at this point, and still further reducing the efficiency of the fastening. 4—The two middle clips are too close together. Clips should be evenly spaced at about six times the rope diameter or more.

Clips should not be drawn up too tight against the rope, but neither should they be permitted to become loose. With the clips fastened, all nuts should again be tightened after the rope has been put under tension. Clips should be tightened with every rope inspection.

When inspecting clip fastenings, it is extremely important to examine the rope at the last clip farthest away from the loop or bight, as fatigue breaks often develop at this point due to the fact that rope vibration or whipping is dampened here. Fatigue damage is less pronounced with preformed wire rope, which may be explained by the reduced tendency of preformed rope to vibrate or "whip", this type of rope being more flexible and not so "springy" as nonpreformed.

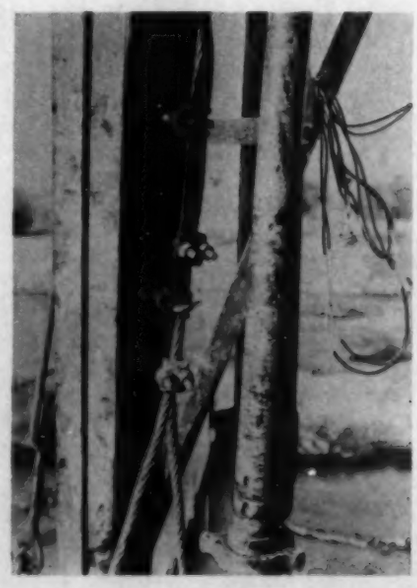
It is important to apply a sufficient number of clips, and the minimum number recommended for different sizes of rope is as listed in Table I.

PHOTO CREDIT

All photos which appeared with Mr. Stringfellow's article, "Girl Truckers", which appeared in the June 7 issue, p. 122, should have been credited to Allis-Chalmers Mfg. Co., Milwaukee.

Table I—"Clipping" Recommendations

Rope Diameter inch	Number of Clips	Spacing of Clips Inches	Length of Wrench Inches
½ to ⅝	3	3	12
¾ to ⅞	4	4½	18
1 to 1⅛	4	6	24
1¼ to 1⅜	4	7	24
1½ to larger	5-7	10	24



Save to win with these four simple rules of battery care:

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery maintenance problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.

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. . . is a vital principle for war-time Industry!

Conservation of materials is no new story to American Industrial men. Conservation has always been an important part of their work.

They've squeezed the last ounce of use out of materials in their care . . . and today, that need is intensified.

One helpful principle to follow is that of "Buy to Last—Save to Win." Buy quality products and equipment, then care for them to avoid needless replacement. That conserves raw material, labor, and space in factories. It frees these productive elements for essential war production.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
Exide Batteries of Canada, Limited, Toronto

Thirty-five foot high "Karbate" absorption tower equipped with graphite trays and bubble caps. One of many examples of the application of these materials.

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are being used successfully in a wide range of important applications in the mechanical, electrical and process industries because of the many advantages offered by their unique combination of physical and chemical properties.

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- **No deformation at high temperatures.**
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- **Mechanical strength maintained at high temperatures.**
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- **High rate of heat transfer (Graphite and Graphite Base "Karbate" products).**
- **Low rate of heat transfer (Carbon and Carbon Base "Karbate" products).**
- **Good electrical conductivity.**
- **Self-lubricating.**
- **Available in impervious grades.**
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- **Easily and accurately machined and fabricated.**
- **Molded and extruded in special shapes when quantity justifies.**

Carbon and graphite materials are available in the form of:
Brick, Blocks, Beams, Plates, Flat or Hollow Tile, Slabs, Pipe, Tubes, Rods, Cylinders, Cement, Paste.

A variety of sizes permits fabrication of all types of equipment from small intricate parts to huge all-carbon structures.

•

Conventional design has been improved and simplified new design made possible by the use of "National" and "Karbate" carbon and graphite products. Following are some of the more important applications:

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SINTERING—Plant Design—II

(Concluded from Last Week)

LIKE the blast furnace operation, sintering is first of all a thermal problem. Heat must be generated and transmitted to the materials to be sintered and the degree of efficiency attained in the use of heat is an important factor in sinter quality, productive capacity, and operating and maintenance costs. In the blast furnace operation the combustion of the fuel takes place at the bottom of a mass of iron bearing material and the products of combustion are forced up through the mass, the location of the zone of fusion remaining more or less fixed. In the sintering operation the combustion of the fuel takes place at the top of a mass of iron bearing material and the products of combustion are sucked down through the mass ahead of the downward moving fusion zone. Natural laws governing the passage of the products of combustion through a mass of iron bearing material are the same in both operations. Uniform resistance to gas flow without restriction to flow is just as desirable in the sintering operation as in the blast furnace operation because in both operations the products of combustion act as the agent for the distribution of heat. The measure of that desired resistance is, of course, in proportion to the depth of the material mass; in the blast furnace the measurement is in dynamic pressure and pounds pressure per square inch, in the sintering operation the measurement is in static pressure and inches of water.

Actual starting point of the sintering operation. Fire from the gas burners is sustained by down draft created by exhaust fan. Photo, Youngstown Sheet & Tube Co.

Productive capacity of any given sintering machine is dependent upon the rapidity with which the mix can be sintered and passed over the hearth. After proper preparation of materials the factors to co-ordinate are depth of bed and machine speed. For good practice the sintering fire must be drawn down through the bed of material uniformly, across the horizontal plane and in vertical speed. The factor governing this uniformity is permeability of the bed to air. Here again the importance of raw material preparation is emphasized. The preferred condition is a flow of air through the bed in sufficient volume and at sufficient velocity to sustain the sintering fire at a maximum intensity and moving downward at the maximum speed consistent with the time element necessary for the transmission of heat to the materials being sintered. Factors governing the attainment of this end are: proper percentage of fuel, proper percentage of moisture, uniform mixture of materials, and proper relation of particle sizes of the materials in the mix.

By CHARLES E. AGNEW
Consultant
Blast Furnace & Sintering Plant Operation
Cleveland

The fuel (carbon) of the sintering mix is burned to carbon dioxide (CO_2) and the volume of air used to burn the fuel of any given operation is simply a matter of mathematical calculation. For good practice the possible limit of fuel percentage in the mix has been well proven to be 5.5 to 6.0 per cent carbon by weight. Sulphur in the mix will replace carbon as fuel practically pound for pound. The fuel percentage may at times be slightly less than the range mentioned but if it is more, a slagging action occurs and the sintering action stops. Using 6 per cent carbon and an assumed production of 1000 tons of sinter in 24 hours, 60 tons, or 120,000 pounds of carbon would be burned. To burn 120,000 pounds of carbon to CO_2, with air at average temperature and density, requires approximately 18,000,000 cubic feet of air, or 12,500 cubic feet per minute in 24 hours.

Sometimes it is said excess air is needed. Aside from the usual 50 per cent excess allowance for theoretical combustion needs in an open-hearth fire

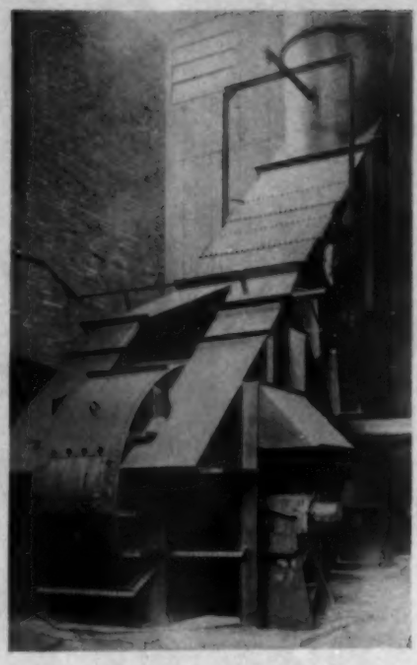
there cannot be any need for excess air in the sintering fire. Excess fan capacity is needed to take care of the foul air which enters the waste gas system through shrinkage cracks in the sinter cake and through seal leaks and the reduction in the amount of this foul air and/or the use of a greater percentage of the fan capacity for sintering purposes offers the opportunity for increased production and important savings in operating and maintenance costs.

Details of Exhaust System

The sintering fire is sustained by a down draft of air created by an exhaust fan. The volume flow of air is measured as static pressure in inches of water. The usual capacity specification of the exhaust fan for the continuous machines is 100 per cent to 400 per cent over theoretical combustion needs and is indicative of the amount of foul air expected. The fan will have a low and a high static pressure specification against a high and a low volume of waste gas, at an assumed average temperature. In an operation when the *static* pressure reading approaches maximum the volume flow of air approaches minimum and when the *pressure* reading approaches minimum the volume flow of air approaches maximum. The preferred condition is a maximum volume of air against a uniform resistance to flow without restriction to flow. The static pressure reading in relation to the fan characteristics compared to theoretical combustion needs is a positive check against the amount of foul air being handled.

Here again the importance of proper preparation of raw materials and the efficient use of return material is emphasized. Where there is segregation of particle sizes when the mix is delivered to the hearth most of the fines will remain at the top of the bed and most of the coarse particles will roll to the bottom. The stratum of fines at the top of the bed will carry the greater percentage of moisture and, consequently, will have the greater percentage of shrinkage. The shrinkage cracks in the top stratum will permit foul air to pass to the more open strata down through the bed and such foul air is just as objectionable as foul air through a seal leak.

The hearth of a sintering machine is an open orifice through which the waste gases enter the gas disposal system. The bed of material on the hearth closes the orifice with the exception of the interstices of the mass. The total area of the interstices on the top surface of the bed then constitutes the orifice through which the air is pulled. If the bed has been prepared properly there will be more uniform shrinkage in the top surface and the air will be pulled through the bed in the preferred filtering manner, but if wide shrinkage cracks develop in the top surface foul air is pulled through. A certain amount of such foul air is inevitable but it should be held to a minimum by the proper preparation of materials.



Induced draft fan which causes flow of air through bed of material on grate bars. Photo, Youngstown Sheet & Tube Co.

Static pressure serves the purpose of equalizing the suction throughout the hearth area but otherwise it is not important in itself; like the dynamic pressure at the blast furnace it is a measure of resistance to the flow of air. The sintering rate will vary with materials because of the resistance offered to the passage of air by the bed of material and to the ability of the material to absorb the heat generated; consequently, the preferred measurement of static pressure will vary with materials.

Relation of particle sizes of materials in the mix is of the utmost importance in the transmission of heat and the flow of waste gas. With the sintering fire being sustained by a down draft the heat of the products of combustion serves to preheat the materials ahead of the fire. The possible degree of efficiency in the transmission of the heat is entirely dependent upon the intimacy of contact between the waste gas and the material of the mix. With the natural tendency of the fines and coarse particles to segregate when deposited on the sintering hearth the most open part of the bed lies next to the grate bars and offers the least resistance to the passage of the waste gas and the least opportunity for the transmission of heat from the gas to the material. Here again the importance of proper preparation of raw materials is emphasized.

With the bed of materials having a stratum of fines at the top and becoming progressively more open downward toward the grates an average permeability throughout a vertical section of the bed can be maintained. Such a bed, however, is most wasteful of heat because as the voids between particles become larger, the waste gases rush through the voids without the opportunity for contact with stock; consequently, the benefit of the heat is lost to the operation but the detrimental effect of it upon grate bars, pallets, and suction necks, is certain and operating and maintenance charges are adversely affected. With proper preparation of materials with regard to particle size to maintain uniform permeability through a vertical section of bed rather than an average permeability the heat will be absorbed more efficiently, the waste gases will travel at less velocity, and consequently will pull less fines through the grates into the wind box and there will be longer life for grate bars and less abrasive action on the fan blades.

Use of heat in sintering is directly comparable to the use of heat in the blast furnace operation. In both operations heat is transmitted from the gas column to the stock column. High temperature in the sintering plant windbox is comparable to high top temperature in the blast furnace; both indicate there has not been proper contact between the gas and the stock for the transmission of heat both indicate a waste of fuel.

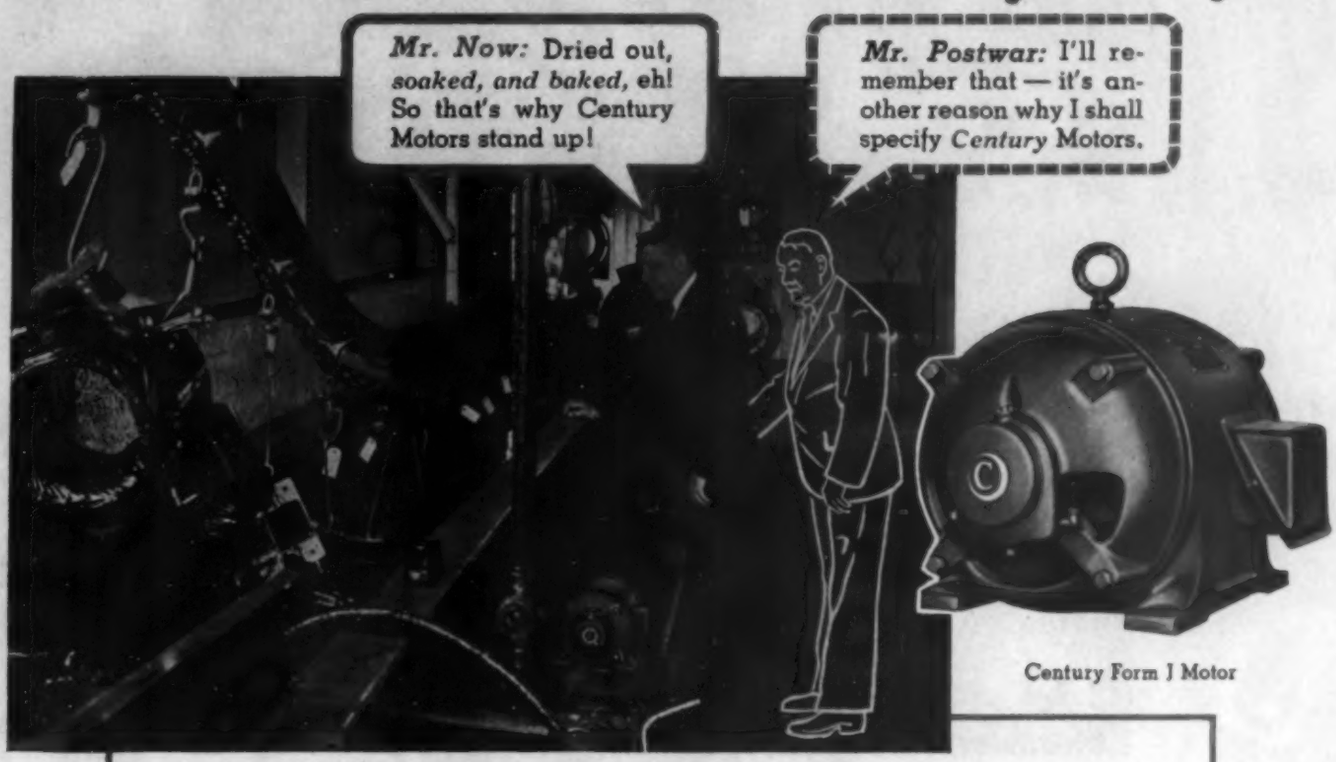
V—Waste Gas Disposal

This is one of the principal items of construction, operating, and maintenance costs. The volume and weight of the gas determine the size of the fan and the amount of fan power consumption. The abrasive action of the fine solids entrained in the waste gas stream is the cause of an expensive item of maintenance costs. The waste gas is composed of the products of combustion of the fuel, plus the moisture of the mix, all of which is converted to water vapor, plus all other released volatiles of the mix, and plus the infiltration of foul air through shrinkage cracks and seal leaks. The total of these gases is expanded in volume to the volume determined by the temperature of the gas and is subject to the natural laws governing the change of volume of gases with a change in temperature.

Here again the importance of heat transmission to the bed of material on the hearth is emphasized. When constructed the cubical dimensions of the waste gas disposal system are fixed. The

(*Please turn to Page* 129)

Take a Look at TOMORROW—*Today!*


Mr. Now: Dried out, *soaked, and baked,* eh! So that's why Century Motors stand up!
Mr. Postwar: I'll remember that — it's another reason why I shall specify *Century* Motors.

Century Form J Motor

The Protection of
CENTURY INSULATION
Assures Continuous Motor Performance Under the Toughest Conditions

By the use of slow-moving conveyors and automatically-controlled ovens, the completed stator and winding of Century Motors is dehydrated, and then is submerged in and passes through a tank filled with Century "Clingto" insulating varnish, and then baked. This process is repeated as necessary to preserve and seal the winding into a homogeneous mass.

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Century slot insulation is built up with fibre board for mechanical strength and varnished cloth for dielectric strength.

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Such insulation material and treatment is absolutely necessary for motor protection for long operating life.

Your nearest Century Application and Service engineer will gladly give you full details of all the advantages of Century Motors—show you why thousands of plants rely on Century for continuous, all-out production.

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One of the Largest EXCLUSIVE Motor and Generator Manufacturers in the World.

Fig. 1—Electronic control cabinet

Wide Motor Speed Range

WITH ALTERNATING-CURRENT SUPPLY

. . . . now made available through newly developed electronic controls

THE SEARCH for a satisfactory motor with exceptionally wide adjustable speed range to operate from alternating current has continued ever since alternating current itself was commercially used. Many solutions have been offered with some degree of success; yet, on many modern machine tools and other industrial machinery, a separate source of direct-current power is furnished in order that a direct-current motor with its desirable characteristics might be used even if it means individual motor-generator sets.

None of the special adjustable speed alternating-current drives for general purpose use are without some undesirable feature, whether it be speed range obtainable, speed torque characteristics, first cost, maintenance, mounting difficulties or others. In many instances where direct-current power is available, the standard direct-current motor does not completely fulfill all requirements; such as extremely wide stable speed range, good speed regulation and smooth automatic acceleration.

One of the latest systems designed to fulfill as many of the desired requirements of an alternating-current variable speed motor as possible is the electronic Mot-O-Trol. The basic idea is not new, Westinghouse having furnished such motor drives on special applications some years ago. Recent refinements eliminate many of the earlier handicaps and make the new electronic systems comparable or better than other existing solutions.

In general, the system consists of a single or polyphase grid-controlled thyratron tube rectifier, which takes power from an alternating-current line and rectifies it into direct-current output. The rectified direct-current voltage is applied to a regular shunt wound direct-current motor and may be varied from zero to motor rated voltage (or above) for direct-current armature control. Smaller thyratrons are also used in the control to provide rectified direct-current field current for the motor, the field voltage being held constant throughout the range of armature voltage and then being reduced to provide greater speed range by field weakening.

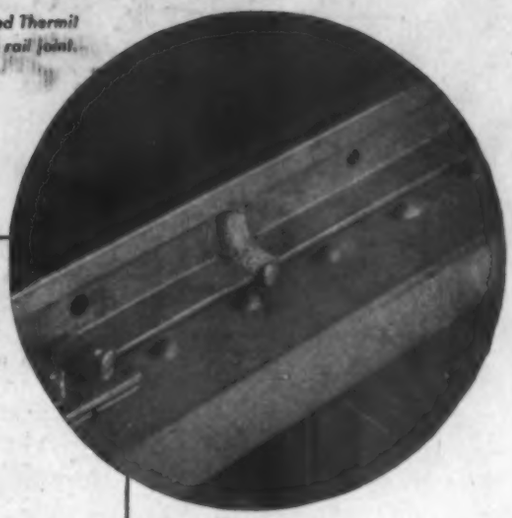
Speeds may be preset to any desired speed within the design range with two speed-control potentiometers and reversing contactors as indicated. Different forward and reverse speeds may be preset so that only the operation of the forward or reverse pushbuttons is necessary to obtain a predetermined speed in either direction.

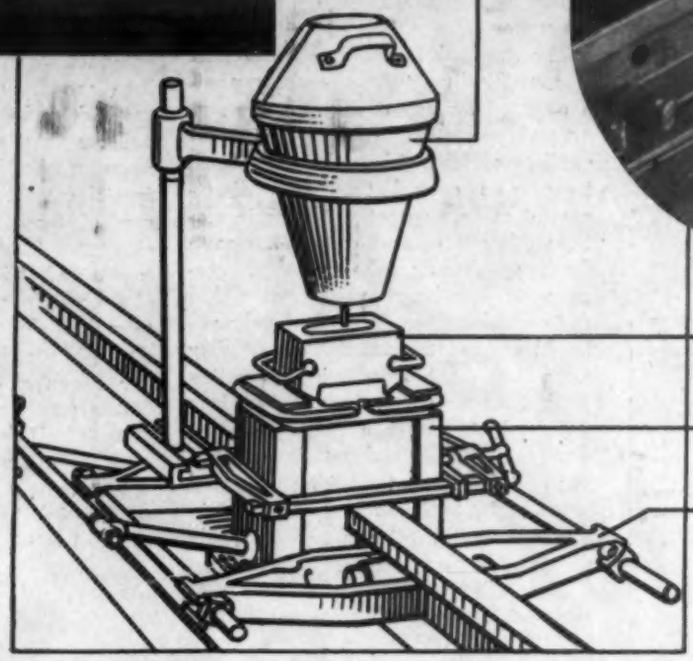
Speed also may be adjusted at any time while the motor is running. Speed control potentiometers are tandem type to cover the entire range of armature and field adjustment on a single dial. Adjustment of the potentiometer changes the firing point on the alternating-current

By T. R. LAWSON
Electronic Control Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Typical battered crane rail joint.

A finished Thermit weld on rail joint.





Simple equipment necessary for Thermit welding of crane runway rail.

SMOOTHER OPERATION, LESS MAINTENANCE with THERMIT WELDED CRANE RUNWAY RAIL

Crane wheels, pounding over mechanical joints, not only batter and chip rail ends, damaging them, as shown in the photograph, but the entire crane structure may be affected due to the repeated blows and vibration. This soon results in excessive maintenance of the structure and the rail joints—tightening or replacing bolts and fish plates — and eventually replacement of the rail itself due to the battered ends.

Many industries have reduced this undue drain on maintenance man-hours, and the accompanying replacement-use of critical materials, by eliminating mechanical rail joints and transforming crane runway track into smooth stretches of Thermit welded continuous rail. With rails forming one continuous surface there are no ends to become battered or worn. Where the rail is collector rail, 100% conductivity is obtained without the use of rail bonds.

The Thermit welding process is easy, rapid—requires no special skill. Only a small amount of equipment, all portable, is required.

Send for informative 16-page booklet, "Thermit Welded Crane Runway Rail"—tells how your own maintenance men quickly become proficient Thermit welders, contains detailed instructions, diagrams and illustrations.

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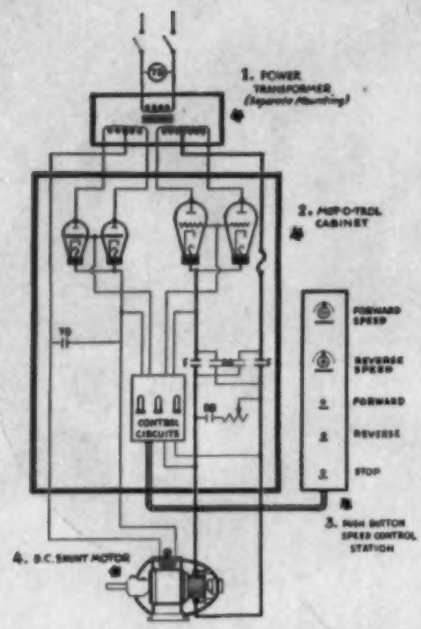
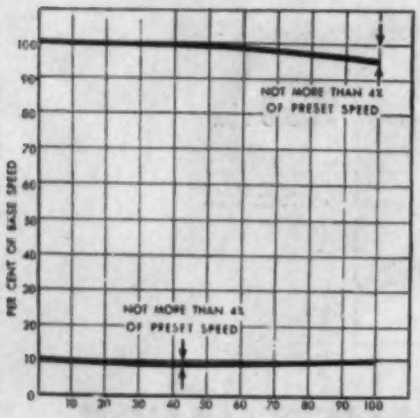
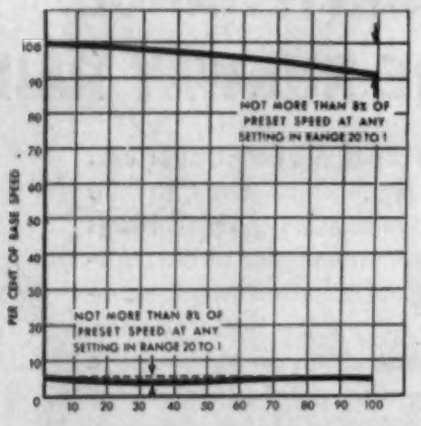
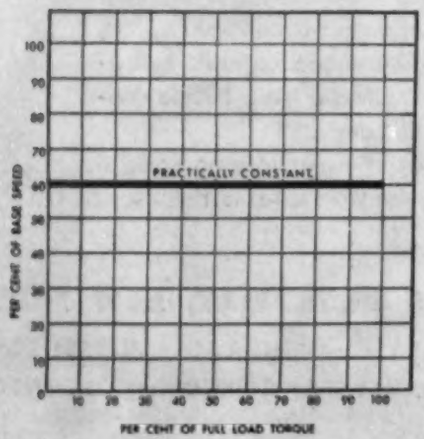





NOT MORE THAN 8% OF PRESET SPEED AT ANY SETTING IN RANGE 20 TO 1
NOT MORE THAN 8% OF PRESET SPEED AT ANY SETTING IN RANGE 20 TO 1
PER CENT OF BASE SPEED



line voltage wave at which the tubes fire and thereby changes the direct-current output voltage as required.

Speed Range and Regulation: The normal speed range by armature control is 20 to 1 (below the base speed of the motor) though a much wider range such as 100 to 1 is obtainable. Above basic speeds field control is used, normally 2 to 1 for standard motors but limited chiefly by the mechanical limitations of the motor.

The standard Mot-O-Trol is designed to automatically regulate the motor speed, if adjusted for any one speed, so as to maintain essentially constant speed regardless of load. Through other small, inexpensive control tubes the direct-current voltage output of the main rectifier tubes is controlled to compensate for speed changes. The degree of compensation can be adjusted from within the control cabinet. In a properly adjusted system, the speed will not vary more than 4 per cent from a presetting (with torque varying from no load to full load value) for a speed range as much as 10 to 1; and not more than 8 per cent for any speed within the speed range of 20 to 1. Normal variations in alternating-current line voltage have only a small effect on the speed regulation.

Motor Rating: Motors furnished with the Mot-O-Trol system are selected to handle constant torque load over the entire armature control speed range (or up to the base speed of the motor) and constant horsepower over the field control range, continuously without exceeding safe temperature limits. The frame size of the motor will depend upon the base speed rating and other operating characteristics but in most ratings will be somewhat larger than the standard direct-current motor frame of the same horsepower and basic speed rating. The reason for a larger motor frame in most cases is due to the high form factor of pulsating current obtained from the rectifier when the firing angle is phased back to obtain low output voltage and consequently low motor speeds.

The control is arranged so that the motor is always started at full field regardless of the setting of the speed potentiometer. If the speed is set above base speed, with weakened field, the speed control does not become effective and the field is not weakened until the motor reaches based speed. Through a special current limiting device built as part of the standard Mot-O-Trol unit, automatic fast but smooth acceleration is obtained. The current limiting device also works from a small auxiliary control tube which in turn controls the firing of the main rectifier tubes so that the voltage output of the rectifier will be such that a preset current limit will not be exceeded. For general application the current limit will be exceeded.

The current limiting device may be set over a wide range up to 200 per cent of rated full load motor current, so that accelerating characteristics may be varied to suit load conditions. If unusually high starting currents are required, the rectifier tubes must be carefully chosen so that their peak ampere rating is not exceeded even though the running load conditions do not exceed the average ampere tube rating.

The motor is stopped by means of a dynamic braking resistor which is not in the motor circuit during running conditions. The amount of braking resistance is adjustable.

Operating Features: In addition to the current limitation feature, the usual thermal overload, low voltage and field failure protection, its advantages are:

—All the desirable characteristics of a direct-current motor drive from an alternating-current supply.

—Only one rotating element (the motor), consequently no vibration trouble from other auxiliary equipment.

—Ease of mounting; control may be mounted in its own cabinet or built into suitable space in machine.

—Finger tip control; no field rheostats required, speed control in regular push button station.

—Adjustable accelerating torque to meet various load requirements. Smooth automatic acceleration.

—Much wider range than normal with stable operation at extremely low speeds and exceptionally good speed regulation under varying load conditions.

—Preset speeds.

Four Pieces of Equipment: Diagra-

(*Please turn to Page* 132)

From top to bottom—

Fig. 2—How the Mot-O-Trol works: Incoming alternating-current power is converted to direct current by grid-controlled rectifier tubes, supplying armature and field circuits of the direct-current motor. Potentiometer controller varies voltage applied to motor by shifting phase of grid-control voltage on rectifier tubes

Fig. 3—Control system holds maximum speed regulation (difference between full load and no load speed) to within 8 per cent at any point in motor speed range of 20 to 1

Fig. 4—Within a motor speed range of 10 to 1, maximum regulation can be limited to 4 per cent at either low or high speeds

Fig. 5—Within the usual operating speed range, speed is constant from zero to maximum torque as shown here

BONDS BUILD BOMBERS

In all branches of transportation there is an eager desire to keep equipment fully abreast of the times—to take every advantage of developments that economize power and increase speed, efficiency, convenience, comfort. Designers of buses, railroad equipment and all other units of transportation are therefore keenly interested in a material that is supreme among all practical weight-saving metals. Magnesium, extracted by Dow from sea water and Michigan brine, is the lightest of all structural metals. At present the bulk of this production must go to the makers of our aircraft. But when peace returns magnesium will play a mighty role in the further development of every medium for the transport of both passengers and freight.

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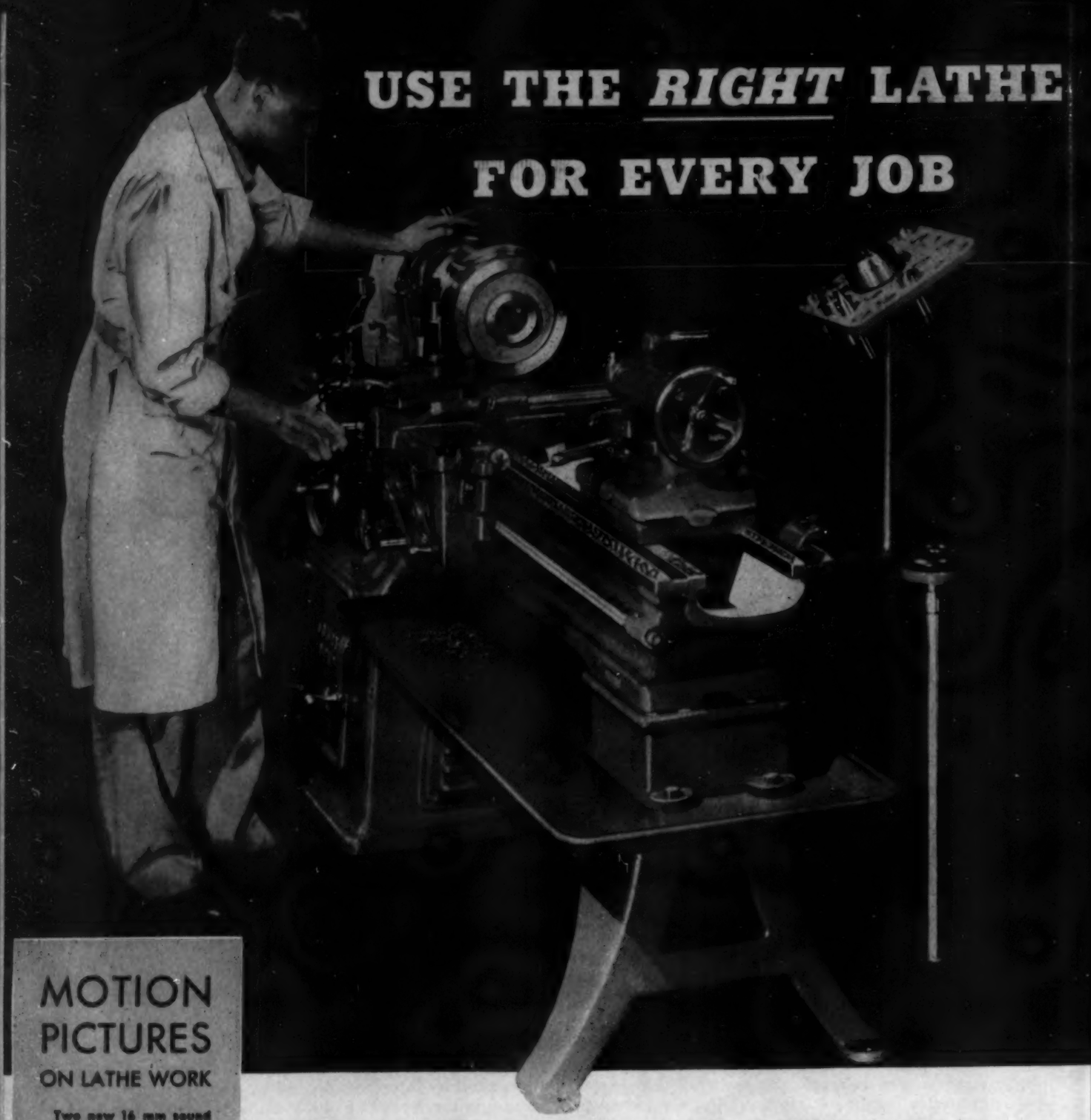
USE THE *RIGHT* LATHE FOR EVERY JOB



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Two new 16 mm sound films in full color are available on a free loan basis for lathe apprentice training in the war industries.

Professionally filmed in our own factory under the direct supervision of competent lathe operators, these pictures clearly show the basic principles of engine lathe operation.

Showing time for each film is approximately 20 minutes. Write today for complete information.

Time, material and manpower can be saved for vital work if you use the *right* lathe for every job. The matching of the job and the lathe has never been more important than today—in no other way can maximum production be obtained. There is no place in our war production effort for slow, obsolete machines of questionable accuracy.

This is proved every day in hundreds of war plants where competent engineers have matched jobs with South Bend Lathes. Their speed, accuracy and ease of operation increase output, hold close tolerances, and conserve manpower for more efficient production.

There is a South Bend Lathe for practically every class of machine work. Toolroom Lathes and Engine Lathes are built in five sizes: 9″, 10″, 13″, 14½″, and 16″ swings. South Bend Turret Lathes are built in two sizes: Series 900, and Series 1000. A wide selection of attachments, accessories and tools are available for special classes of work. Write for information, specifying size and type of lathe in which you are interested.

ARMY E NAVY

SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA — LATHE BUILDERS FOR 36 YEARS

Painting Speed Increased 400 Per Cent

INNOVATIONS at the Propeller Division plants of Nash-Kelvinator Corp. have increased output more than 400 per cent in the propeller blade painting department. Many labor-saving steps have been developed, and some 48 hours of drying time saved.

Considering the total time elapsed between the beginning and the end of the painting and drying operation in the blade department, it may be stated for comparative purposes that the average time was 40 minutes under the old method while it is now considerably less than 4 minutes. In addition, the final drying period of 48 hours—the amount of time it took for the blades to dry after work on them was completed in the blade painting department—has been completely eliminated.

Under methods used when Nash-Kelvinator first began the mass production of the intricate and delicately-balanced Hamilton standard hydromatic propellers, blades ready for painting were first carefully cleaned by hand with a lacquer thinner. They were then carried individually to the spray booth, where the butt end of the blade was masked with tape. The blade was placed tip up on the floor and a thin coat of zinc chromate primer was applied.

When this primer coat had flashed off, the tip of the blade was sprayed with yellow lacquer (the tips of the blades are painted yellow as a safety measure for ground crews working at night). After this had dried for 30 minutes, the tip was masked off and the remaining primed portion of the blade given a double coat of black lacquer, which was allowed to dry in the booth for 15 minutes.

The blades then were removed from the blade department to undergo 48 hours of drying before final assembly.

Under the present process the blades are cleaned in a trichlorethylene vapor degreaser system, which also heats them as it cleans them. The blades are hung butt end up in a metal mask on a pusher type monorail conveyor and lowered in the degreaser, thus eliminating considerable handling as well as the old masking operation. After this they are transferred to a power conveyor. Both primer coat and yellow tip are sprayed on groups of blades at once. Blades then pass through an infra-red drying oven, after which they are ready for the masking of the yellow tip and application of the standard coat of black lacquer.

To eliminate the 40-hour final drying period and to speed up the entire finishing cycle, batteries of infra-red lamps were set up in the propellor plant. These lamps now dry the blades in the 4 minutes that it takes them to traverse this small unit

To eliminate the 48-hour final drying period and to speed up the process, generally, several batteries of infra-red lamps, such as the company had used in its automobile and refrigerator plants, were introduced. These lamps now dry the blades in less than 4 minutes.

The propeller blades are so carefully balanced during their processing that even the thin film of paint must be applied exactly, and each newly-painted blade is checked for perfect balance before it is sent to the final assembly departments.

Metal Statistics in Thirty-Sixth Year

Metal Statistics, 1943; 728 pages, 4 x 6 inches; published by *American Metal Market*, New York, for $2.

This is the thirty-sixth annual issue of this publication and brings up to date the same assortment of statistical information on ferrous and nonferrous metals and miscellaneous economic subjects as in prior issues.

Due to the war it has been impossible to furnish authentic data on production and consumption of steel, iron and metals in foreign countries and in this country publication of statistics on production, consumption and stocks of the principal nonferrous metals has been interdicted. Iron and steel figures, except for exports and imports are almost as complete as in former years.

Analysis of Debt Policy

The New Philosophy of Public Debt, by Harold G. Moulton; cloth, 83 pages, 4¾ x 7 inches; published by the Brookings Institution, Washington, for $1.

A new philosophy of public debt has gained acceptance in influential quarters. The traditional view has been that sound fiscal policy requires holding a nation's debt to as low a level as is possible. According to the new conception, a continuous expansion of the public debt is necessary for prosperity, and the size of an internal public debt is immaterial.

In this volume the new philosophy is analyzed with especial reference to its bearing on inflation.

"SUPER" GRINDING

Prolongs

TOOL LIFE

By REGINALD TRAUTSCHOLD

FEW DEVELOPMENTS in metal cutting—that is, in conventional machining practice— have given so much promise of effecting important mechanical advances as do those discoveries at the Wright Aeronautical Corp. where, by virtue of fine-finish grinding of the cutting faces and the use of correctly proportioned chip breaker grooves, the productive life of lathe tools has actually been prolonged as much as twenty-fold and even more. Over 100,000 alloy steel forgings were machined (rough turned) by such superfinish tools with service results, compared to those obtained with conventionally hand-ground tools, as tabulated. A standard tool for rough turning was employed—one with a 13-degree side rake, 5-degree back rake, 6-degree front and side clearances, and a chip breaker design adapted to the application.

These superfinish tools are ground at Wright's in gang fixtures holding 18 cutting tools against the dressing wheel, thereby attaining a degree of ground surface smoothness and uniformity quite unobtainable in customary hand grinding. The marked difference in resulting tool serviceability (tool life) is thought due to the much more even flow of metal through the crevices at the edge of the superfinish cutting tool and the fact that the variable cutting edge of hand-ground tools, relatively unavoidable, must create more pronounced concentrations in cutting stress and more tool fouling, with consequent increases in generated heat, abrasive wear and early tool breakdown.

So general, as well as so marked, are the prolongations in tool life at Wright's —indicative of substantial attainable increases in production on other war work —that interest centers for the moment upon the great amount of lost effort and inefficiency in common machining operations performed with conventionally hand-dressed tools.

Of especial concern is that properly ground tools of molybdenum steel can be used in place of tools that have heretofore had to be toughened to the task by including such critical alloying ingredients as tungsten, cobalt, etc.—all of which are alarmingly scarce at the present.

Surface Influence: The uniformity of chip, or of metal removed—hence, the relative smoothness of the work machined —naturally exerts much influence upon the tool life, a fact that is perhaps more clearly evident from the graphic depiction of results at Wright's shown in the chart based upon the compilation of statistical data.

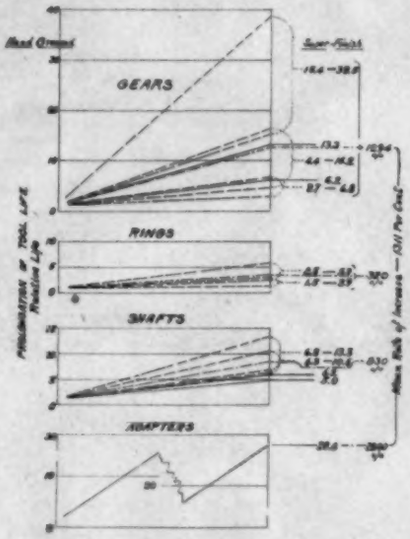


Chart shows prolongation of tool life obtained by use of machine superfinish applied to cutting tools. Scale at left is relative life—all show increase in life from "norm" of 1. Note rate of increase runs up to 28 on the adapters, representing 2800 per cent increase in tool life

Necessarily, the character and complexity of the machining involved are considerations, as evidenced by the far greater relative prolongation of tool life in such operations as cutting gears, the drop in degree of betterment when turning shafts, and the even more restricted improvement in the case of rings, which latter task commonly involves a minimum of machining. In finishing adapters, on the other hand, in which the weight of metal removed from a multiplicity of surfaces is even less uniform than in gear cutting, the life prolongation of superfinish tools is customarily considerably higher.

Since the cross feed of the cutting tool is commonly subject to quite sensitive control, it appears evident that the destructive frictional heat generated in the machining process is governed more by the relative smoothness of the work surface than it is by the depth of feed, or thickness of chip removed—likewise, the abrasive wear responsible for the destructive heating more by the textural characteristics of the work surface than by the hardness of the machined surface —and whether the metal removed is of fibrous or crystalline structure. This highly relevant fact is, furthermore, of potent concern in manufacturing bearings, especially those of antifriction type in which proper bearing surface conditioning is an outstanding requirement.

TABLE I—Production Comparison Between Hand-Ground and Superfinish Lathe Tools

Operation	Production per Tool Dressing — Hand Ground	Production per Tool Dressing — Machine Ground	Production Increase
Gear cutting	13	200 to 500	150 to 3850
	30	400	1330
	10	44 to 162	440 to 1620
	15	40 to 102	270 to 680
	18	111	620
Rings	100	150 to 290	150 to 290
	20	50 to 117	250 to 590
Shafts	30	200 to 319	670 to 1060
	15	103 to 200	680 to 1330
	8	40	500
	8	50	620
Adapter	1	28	2800

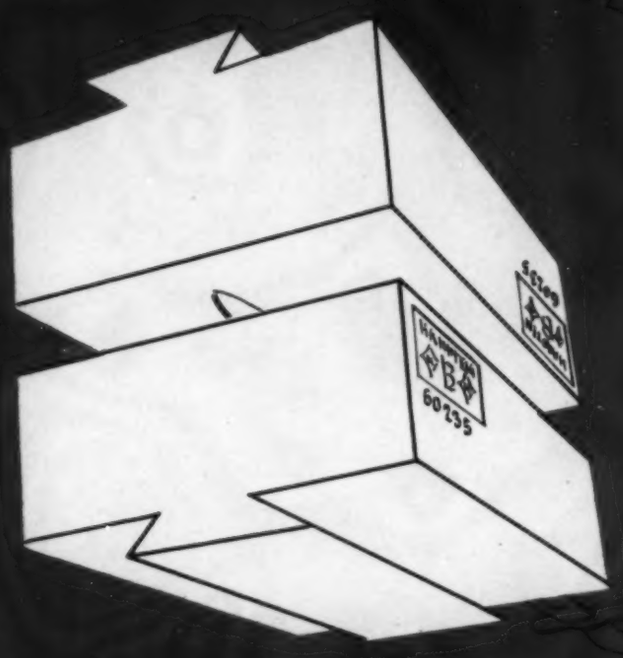
Data from Wright Aeronautical Corp.—based on machining over 100,000 alloy steel forgings.

Sound Film Directed To Women War Workers

Addressed specifically to the woman war worker and her health problems is a new sound film, "To the Women," recently released by Commercial Films Inc., Cleveland. It covers in dramatic fashion various health problems the woman war worker encounters, and is designed to help cut absenteeism.

The film, according to Commercial Films, was produced with the co-operation of C. O. Sappington, M. D., Dr. P. H., an authority on industrial health and preventive medicine.

THREE WAYS to save Die Blocks*



*Three simple rules for hammer operators to follow —to lengthen the life of the die blocks you buy:

1 *Go easy on the lubricant.* Too much is as bad as too little. It's liable to cause fire-cracking.

2 *Be gentle when you break in new dies.* Greater initial care will give you more forgings per sinking.

3 *Seat them perfectly in the sow block.* Precise alignment is good insurance against block breakage.

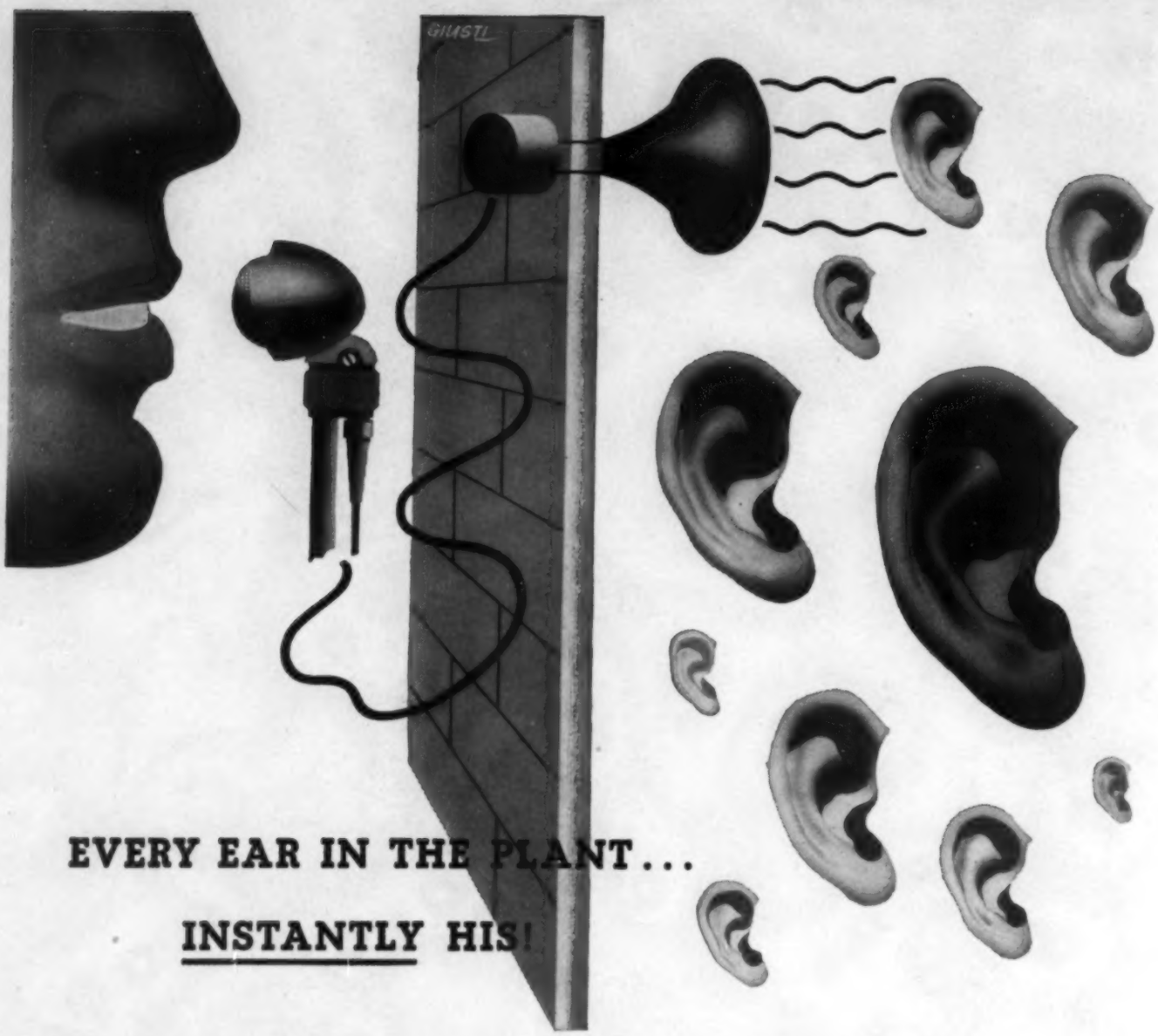
One more thing. Due to recent expansion of production facilities, Heppenstall Hardtem Die Blocks are now available for quicker delivery. There has been no change in Heppenstall quality standards and the exclusive Hardtem heat treating process which assures more forgings per sinking. You'll find it pays to specify Heppenstall Hardtem when your blocks need replacement.

To help speed your war work, Heppenstall offers you this free steel-weight calculator. Write now—the supply is limited.

Heppenstall

PITTSBURGH • DETROIT • BRIDGEPORT
EDDYSTONE

Forging Fine Steels for Fifty-Three Years



EVERY EAR IN THE PLANT...

INSTANTLY HIS!

"Mr. Harker, please! . . . Washington calling . . . report at once to plant manager."

"Calling Mr. Thomas . . . please attend meeting at production engineering office immediately."

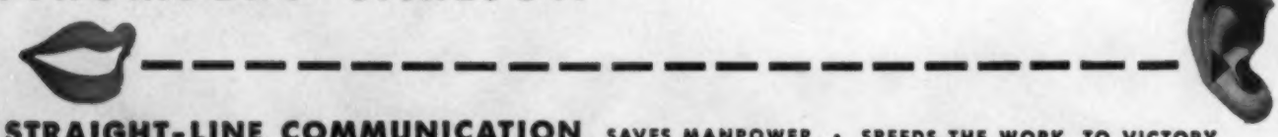
★ ★ ★

What a savings in manpower . . . what a savings in valuable time . . . when messages are delivered by Straight-Line Communication!

It does the job **QUICKER** and **BETTER** than by any other means . . . and the man-hours it saves more than pay for the installation in an amazingly short period of time.

For 49 years Stromberg-Carlson has been developing the finest type of sound reproducing equipment. Why not let us show you how we can solve your own communication problem? Get in touch with the Sound Systems Division of the Stromberg-Carlson Company, 100 Carlson Road, Rochester, New York. Write for free Booklet No. 1940.

STROMBERG-CARLSON



STRAIGHT-LINE COMMUNICATION SAVES MANPOWER • SPEEDS THE WORK TO VICTORY

Device Improves Welding Of Steel Studs to Hinges

A device reported to make practically fool-proof the projection welding of steel studs on metal hinges and sheet metal surfaces was recently perfected by Andrew Campriello, a foreman and spot welder at General Electric's Schenectady Works.

The device calls for a vertically-milled slot in the tapered collet which is located in the bottom electrode. When the stud is introduced in the collet and the upper electrode is depressed, the jaws of the collet close tightly about the stud. Resulting pressure causes current to be distributed evenly on all sides, and at the top of the stud near the welding zone rather than through the entire stud and then to the sheet.

Below the collet is a space for air, forced in under pressure by a hose. As soon as the welding is complete and the upper electrode lifted, the air pressure forces the tapered collet upward. The collet expands and releases the stud. "Binding" of the stud on release was formerly a problem.

When the collet reaches a height sufficient to release the stud, its movement is stopped by a setscraw which engages the bottom of the collet.

Leaflet Describes Coke Plant Construction

"Coke Oven Plant Construction and Development in 1942" is the subject of a leaflet just issued by Koppers Co., Engineering and Construction Division.

Written by W. A. Leech, Jr., of Koppers, the publication represents a summary of recent developments in the field of coke plant construction. It lists improvements in design, cites certain new processes and reveals last year's construction figures. During that period eleven coke plants were built and put into operation by Koppers.

Simplifies Control Analysis

One step in method of determining molybdenum removes many of the troubles encountered particularly when small quantities of the element are involved

By C. G. HUMMON
Chief Chemist
Sheffield Steel Corp.
Kansas City, Mo.

CHEMICAL laboratories over the country are doing their part in the program to turn out a greater tonnage of alloy steel by producing more accurate control-analysis faster than ever before for steelmakers. The scrap that steel manufacturers receive nowadays for the open-hearth charge is becoming more contaminated with impurities and various alloys. A few years ago, interfering elements were not present in more than a few hundredths per cent and, therefore, they did not present a serious problem.

Now, with the shortage of molybdenum, a close check is kept of the scrap and the bath before any additions are made. In making determinations of molybdenum in such small quantities at present, difficulties are encountered in completely reducing the red color of ferric thiocyanate and some trouble from copper precipitating as the sulphocyanide.

No claim is made for the originality of the following method, which no doubt has been in use in laboratories, but with the addition of one step in the procedure, which requires probably three minutes of extra time, all difficulties have been eliminated. This step in the procedure consists of the addition of 20 milliliters of a cold perchloric acid solution, 5 milliliters of sodium thiocyanate, 15 milliliters of stannous chloride solution and re-extracting the butyl acetate solution after having drawn off all of the first acid and water layer. The addition of the cold perchloric acid solution is an important phase of the procedure.

Solution

Sodium thiocyanate (NaCNS)—5 per cent, 25 grams to 500 milliliters water.

Stannous chloride ($SnCl_2$) — 112 grams of stannous chloride dissolved in 100 milliliters of concentrated hydrochloric acid. Dilute to 1 liter and add granular tin to preserve the solution.

Perchloric acid — 40 milliliters of 70 per cent perchloric acid in 100 milliliters of water.

Procedure

Weigh accurately a 0.1-gram sample and transfer to a 200-milliliter erlenmeyer flask. Add 20 milliliters of perchloric acid and 10 milliliters of water. Heat until solution is complete. (Note—for cast irons, remove from hot plate just before solution is complete and add a few drops of hydrofluoric acid, then proceed as in steel). Continue heating until dense white fumes clear out and hover over mouth of flask. Let cool and add 50 milliliters of water. The solution is cooled to below 20 degrees Cent. (68 degrees Fahr.) Cast iron should be filtered before cooling to remove graphite.

To the cold solution, add 10 milliliters of sodium thiocyanate and shake thoroughly. Now add 25 milliliters of stannous chloride and mix well. Transfer the solution to a 250-milliliter separatory funnel and add 50 milliliters of butyl acetate. Stopper the funnel and shake hard for at least 60 seconds. The foregoing procedure must be carried out without stopping, therefore, have funnels, graduates, and solutions clean, cold and ready. Always rinse the funnel twice with distilled water just before using.

Allow the layer to separate, remove stopper and drain off all of the acid layer. Add from 4 to 5 milliliters of sodium thiocyanate and 20 milliliters of cold perchloric acid solution and shake well; now add from 14 to 15 milliliters of stannous chloride solution and shake hard for 30 seconds, let solution settle and drain off the acid layer. Give the funnel a few swirls, again let the contained water settle for a few seconds and then drain off the excess water. The orange layer is now drained off into a 50-milliliter graduate and the solution again is allowed to stand for a few seconds. This will remove practically all of the water. Pour the solution carefully into a 50-milliliter volumetric flask and make up to the mark. The solution is well mixed and is now ready for the photelometer. The procedure used in taking the reading on a Cenco-type photelometer is:

The blue filter is placed in the filter holder and two cells are thoroughly cleansed. Add distilled water to the middle cell and a portion of the solution containing the molybdenum to the other. Switch on the photelometer light several minutes before a reading is taken to fatigue the photoelectric unit. Place the cell containing the distilled water in the path of the beam of light, and adjust the intensity of the light with the diaphragm until the needle of the galvanometer reads 100. Now slide the cell containing the colored butyl acetate into the path of light and note the galvanometer reading.

INDUSTRIAL EQUIPMENT

Inspection Instrument

Larrimore Sales Co., St. Louis, announces the Inspector—said to be a highly perfected instrument, combining two tube fluorescent "daylighting" with single or double 5-inch magnifying lens

to assure accuracy and eliminate eye strain in usual inspection work during and after production, by the tool designer or maker, in first-aid, by the engineering department and others in reading small detail on maps, blue prints, micrometers, etc.

A feature of the unit is the type brackets used. These, it is said, are the most practical ever offered, making the instrument very flexible when in use. Unit is being offered in either bench or floor models.

Welding Machines

Hanson-Van Winkle-Munning Co., Matawan, N. J., announces a new type low-voltage electric current multiple-operator welding machine, for use especially in shipyards to enable a large group of welders to work from one motor-generator set instead of having an individual motor-generator set for each welder. Its primary purpose is to facilitate and quicken welding operations.

The equipment is reported to service a number of operators, since at no time will all of them be using their joint machine simultaneously. It also reduces floor space by keeping the current generating equipment to the most efficient minimum, centralizing the rotating and control equipment and giving the maximum deck and aisle space to the operators.

The motor-generator set features a capacity of 1500 amperes at 70 volts, and is made in two types—stationary and semi-portable. In the stationary type, the drive motor can be either alternating or direct current. If the drive is the former, the motor can be of either the synchronous or induction type, for 60 or 25-cycle operation.

Motors can be of any voltage; 220, 440 or 550 for alternating or direct current, or 2300 volts for the alternating-current drive. Motor starter panel and generator control panel are complete, separate units that must be permanently installed. The semi-portable type is a complete drive and control mounted on a single bed plate, completely wired and easily accessible. Units can be picked up and moved by a crane without difficulty.

Coolant Spout

J. N. Fauver Co. Inc., Detroit, is offering a new Bullseye coolant spout which can be readily adjusted by finger-tip pressure to any angle or curve, directing the coolant stream directly on the tool. It is said it can be easily fished under, over, through or around rigid machine parts.

Flexibility of the spout permits its easy re-adjustment as the work progresses and

eliminates the elbows, Ts, Ls, connectors and adaptors that complicate rigid piping.

Unit is being offered in a range of sizes (⅛ to ¾ inside diameter), in any length. Furthermore, it is reported, it is rustproof, leakproof and scaleproof —adjustable also for oil, air, water, steam and grease.

Dual-Vane Pumps

Hydra-Motive Division, 723 East Milwaukee avenue, Detroit, is now offering three new constant delivery, hydraulic vane type pumps for high pressure operation. Available in three sizes to give service from 2½ to 60 gallons per minute, these are of the dual vane design and also incorporate the new "compound pumping" development which increases the capacity of the pump by as much as 30 per cent without increase in the overall size of the housing.

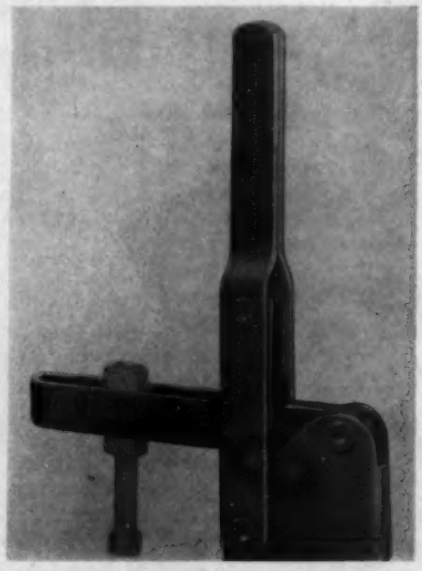
Maximum continuous operating pressure of standard pumps is 1250 pounds per square inch, but they also are available for operation at considerably high pressure. Pressures as high as 2000 pounds per square inch can be handled for prolonged periods without damage or overheating, it is said.

Compound pumping consists essentially of employing the ends of the vanes nearest the shaft to function as a piston-type pump. On the intake cycle, when the vanes move outwardly from the center, they "pick up" oil from an intake port and trap it in the vane slot. On the outlet or pressure portion of the cycle, when the vanes are forced back toward the shaft by the change in contour of the stator, the oil is forced out of the vane slot into an outlet port which connects with the main outlet. This sequence occurs twice during each revolution of the rotor and at diametrically opposite sides so that the operation is entirely balanced. Thus all forces on the shaft bearings are cancelled out.

The three pumps are available in the following range of volume capacities: 2½ to 12 gallons per minute, 13 to 30 gallons per minute and 37 to 60 gallons per minute. All three units are offered with foot mounting. The two smaller ones are available with motor adaptor mounting.

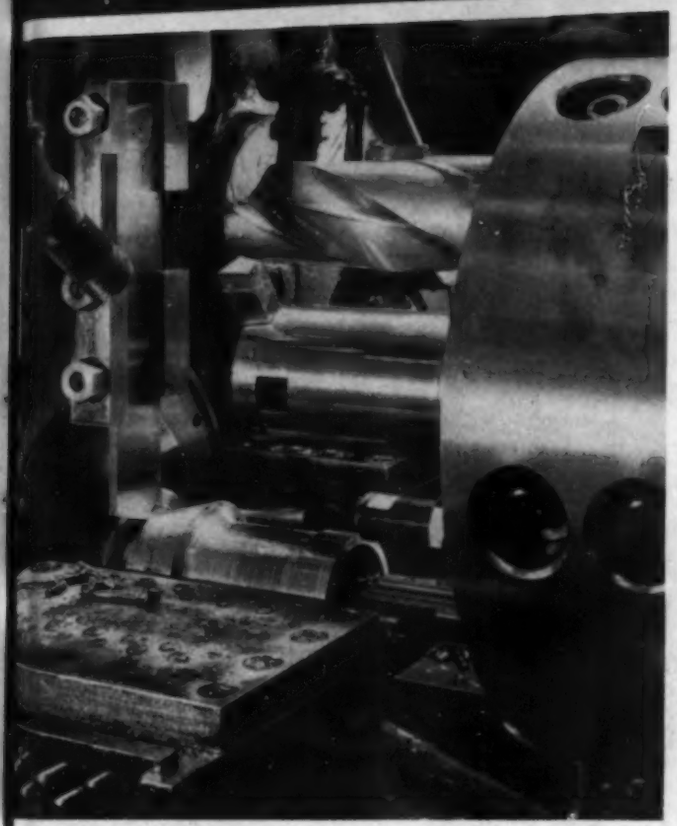
Toggle Clamp

Detroit Stamping Co., 359 Midland avenue, Detroit, is offering a new, small, light duty clamp especially suitable for use in aircraft construction, or on other



work where clamping space is limited. It measures only 5½ inches in height overall.

Sets Up Quickly Runs Profitably on CLEVELAND AUTOMATICS with UNIVERSAL CAMMING



THE job shown in work in the photograph at left was processed on a Cleveland *Single Spindle* Automatic. The savings made, in cost and in production time are typical of savings anyone concerned with production wants to make, so give a moment's consideration to this case history . . .

Stock . . . 6½ inch bar, 4160 steel, hot finish.

Operations . . . Gauge, rough drill, rough turn O.D. in two stages, form O.D. complete, rough bore, finish bore, ream and cut off. Finish length 9 1/16 inches. Length of body (formed with one tool) 6½ inches.

This Job Was Set Up Quickly . . . because every operation on a Cleveland Automatic is controlled by standard cams, easily reached and quickly set to any position with the aid of an exclusively Cleveland universal adjustment feature. All control settings are simplified by quick-reading calibrations which reduce original set-up time to a remarkable minimum, also make it possible to retool accurately for a re-run.

Ran Profitably . . . because one Cleveland accomplished what two machines and operators had formerly done, resulting in a saving of more than 62 per cent. This is typical of Cleveland Automatic economies.

Just Remember.."CLEVELANDS CUT COSTS"

That is why, with production men, Clevelands have a reputation for two important advantages . . .

- **1.** Maximum sustained production on long runs, with minimum down time for adjustments . . .
- **2.** Profitable economy on small-lot, short-run jobs.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

CLEVELAND, OHIO

SALES OFFICES

CHICAGO: 20 North Wacker Drive, Civic Opera Bldg., Room 1408
DETROIT: 540 New Center Building ★ ★ ★
NEWARK: 902 American Insurance Bldg.
CINCINNATI: 1315 American Building

Uniform Temperature + High Capacity with

R-S Salt Bath Furnaces

R-S pioneered in the development of Salt Bath Furnaces for the heat treatment of aluminum alloy parts. Some of these installations have been in continuous operation for fifteen years or more.

The exceptional results obtained in temperature uniformity with the consequential uniform physical properties, have convinced such customers that these furnaces have no equal for heat treating aluminum.

High capacity with minimum floor space is also an important consideration.

Small R-S Salt Pot Furnaces are used for tempering, the solution heat treatment of aluminum parts, and for hardening steel.

If you need additional facilities for heat treating aluminum aircraft parts or stampings, we shall be glad to submit detailed information on the equipment required.

FURNACE DIVISION
R-S PRODUCTS CORPORATION
122 Berkley Street • Philadelphia, Pa.

ANNEALING • PLATE AND ANGLE HEATING • FORGING
ROTARY HEARTH • METAL MELTING • CONVECTION
CAR HEARTH • CONTINUOUS CONVEYOR • SALT BATH

R-S Furnaces of Distinction

BUY WAR BONDS

The clamp features a base 1⅝ x 1¾ inches. Length of bar from handle to tip is 2¼ inches. Two styles are being offered—model 207S with solid straight bar, and model 207U with U shape bar.

Honing Machines

Micromatic Hone Corp., Detroit, is offering a new line of vertical honing machines in two models. These have a capacity of ¼ to ⅞-inch diameter work up to 12 inches long and ⅞ to 2-inch diameter to 12 inches long respectively.

Both models feature a maximum working stroke of 15 inches. Spindle of each unit is driven by a belt-driven spline. It is also arranged with integral, mechanically actuated reciprocation of the tool. The entire spindle head also is reciprocated on honed bars under hydraulic con-

trol with adjustable speed. Standard manual adjustment is provided for the spindle head, and also, an adjustment of lift-out stroke above the operating stroke.

Additional hydraulic controls, provided in the hydraulic control panel, include:

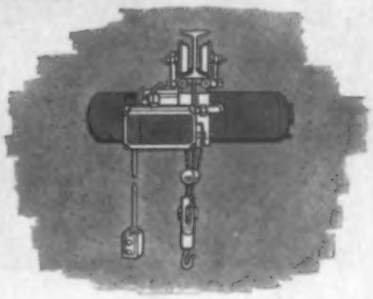
Automatic timer for cycle of spindle head movement, manual visual control of tool approach to work, dwell control for spindle head stroke, emergency stop for spindle head movement. Electric controls comprise all push-button controls for start-stop-short stroke. The machines are furnished with riser block tables, and ventilated columns.

Combination Push Button

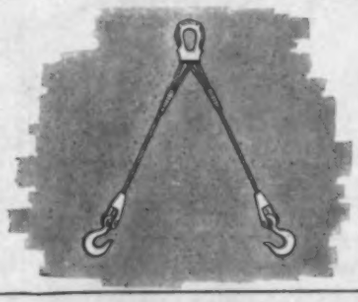
Northern Engineering Works, 2615 Atwater street, Detroit, announces development of a multiple-speed push button

Salient POINTS IN CMP Re: *Buying Wire Rope*

WHEN BUYING WIRE ROPE FOR INCLUSION IN A PRODUCT YOU ARE MAKING,



REMEMBER: Wire rope is a Controlled Material • Your orders should bear the abbreviated allotment numbers—such as: W-8-20 • Preference ratings on orders bearing allotment numbers are valueless. Wire rope producers are required to fill authorized controlled materials orders without regard to preference ratings • The allotment number on a wire rope order must show the actual month of delivery and *not* the quarter in which delivery is required.

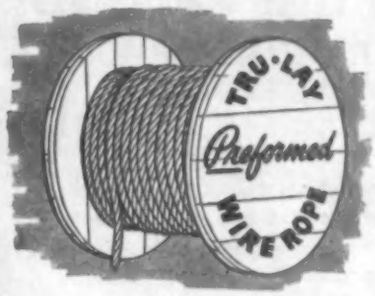


WHEN BUYING WIRE ROPE ASSEMBLIES,

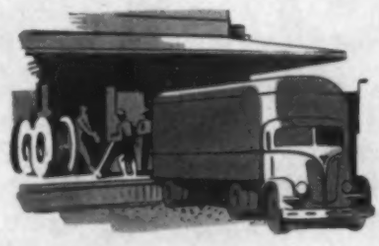
REMEMBER: Assemblies consisting of wire rope and fittings are Class B if they are air-borne, but Class A if they are not • If Class A, you must furnish us with an allotment of the steel required for the wire rope, and for the fittings if they are also class A • If Class B, you must not furnish an allotment of steel for either the fittings or the rope • In either case, your orders must bear allotment numbers or they cannot be considered delivery orders for products containing controlled material.

WHEN BUYING WIRE ROPE FOR MAINTENANCE, REPAIRS, OR OPERATING SUPPLIES,

REMEMBER: Subject to the limitations imposed upon you by any "P" order under which you may be required to operate, and provided you produce a product or are engaged in any business in Schedules I or II of CMP Reg. 5, the symbol MRO on a wire rope order, followed by any appropriate certification, makes your order an authorized controlled material order, and • A preference rating is not required, because wire rope is a controlled material • Just be sure to observe the quantity restrictions stated in Par. (f), CMP Reg. 5.



WHEN BUYING WIRE ROPE IN SMALL QUANTITIES FROM WAREHOUSES,



REMEMBER: You don't need an allotment number or a preference rating for wire rope if • 1—You order in amounts of $10 or less, • or 2—If you don't buy more than 4,000 pounds per calendar quarter, or • 3—If you are authorized to buy it under Food Production Order 3 • Just be certain that you don't exceed the inventory limitations stated in CMP Reg. 2 • Certify your orders as stated in CMP Reg. 4.

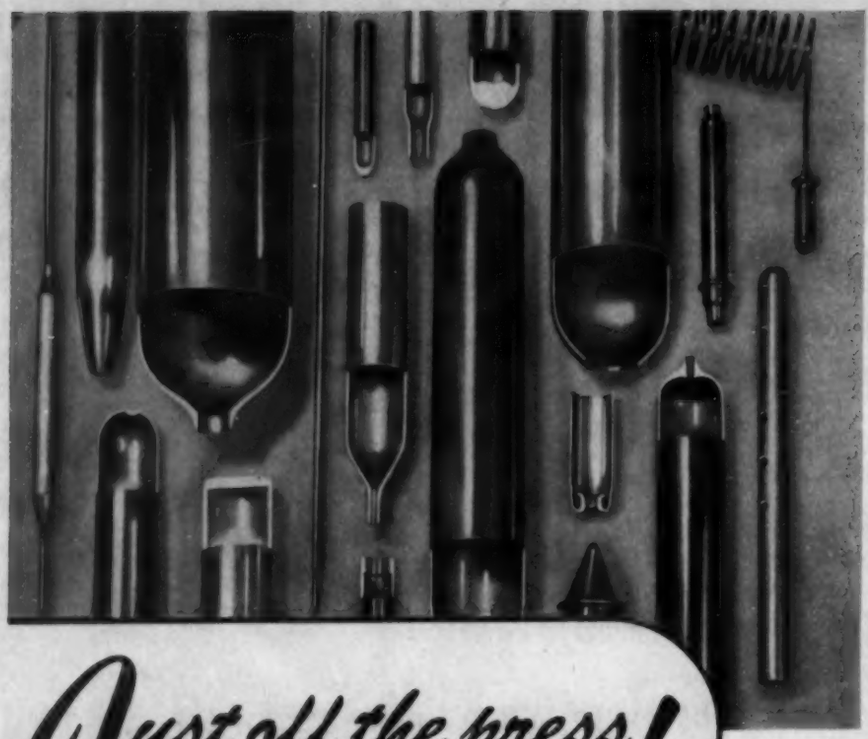
AMERICAN CABLE DIVISION Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

(May 20, 1943)

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*



Just off the press!

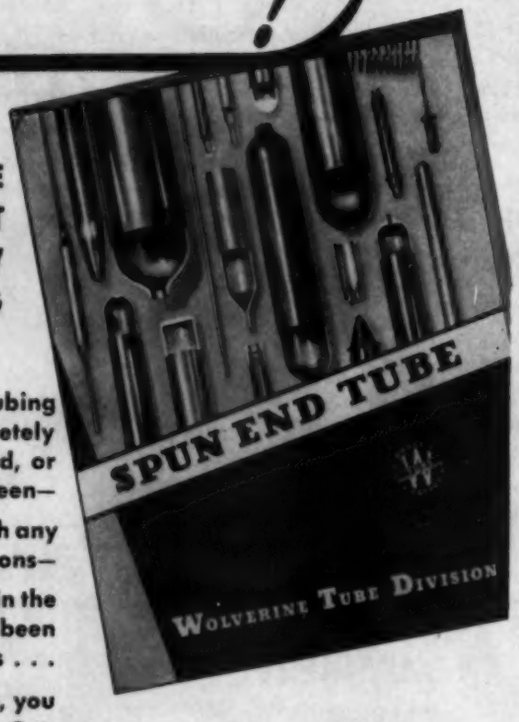
—THIS BROCHURE THAT TELLS ABOUT WOLVERINE'S NEW TUBE-SPINNING PROCESS

If you make anything from tubing —if your product has a completely closed end, is slightly reduced, or assumes any shape in between—

If you are having difficulty with any of your tube-forming operations—

Or even if your product is still in the design stage and has never been manufactured by any process . . .

If any of these things are true, you should send for this Brochure, Catalog E-1, (on your own letterhead) to learn about this new development which successfully achieves the forming of the ends of tubing in a fraction of the time possible by older methods—and at a fraction of the cost.

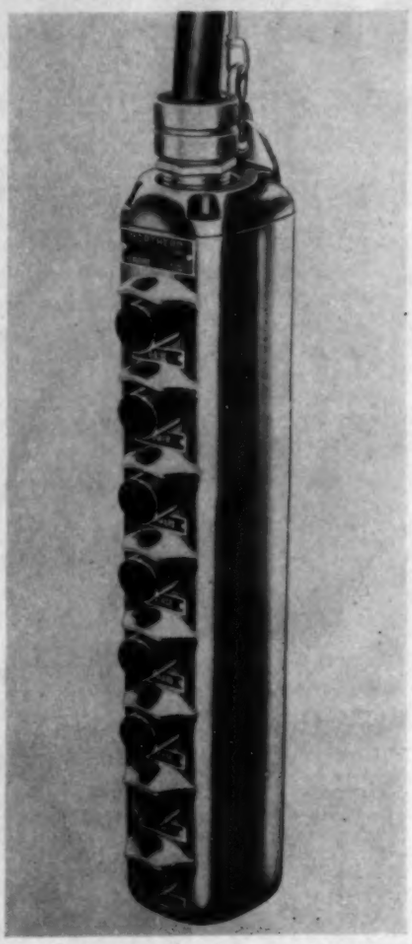


Write Detroit for Catalog E-1. It shows with photographs, line drawings and descriptions that there is practically no limit to the variety of forms that can be made on ends of tubing by the new Wolverine Spinning Process.

CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
WOLVERINE TUBE DIVISION
Seamless Copper — Brass
1439 CENTRAL AVENUE DETROIT, MICHIGAN

which provides up to five speeds in a single button. A battery of these buttons mounted in a pendant is shown in the accompanying illustration. Each provides one to five speeds on the device controlled.

As the button is pushed in, it moves a metal cylinder to wipe over a succession of contacts. The contacts are steel balls



mounted on springs, stiff enough so the operator can feel successive clicks, but not stiff enough to make the button difficult to operate.

While designed primarily for crane and hoist operation, the company states, this button is easily adaptable to any machine where pilot or relay circuits are used.

Degreasing Tank

Aeroil Burner Co. Inc., West New York, N. J., is offering a Dipmaster Jr. portable electrically heated metal degreasing and cleaning tank for fast cleaning and degreasing metal parts. Its average heating time from a cold start to boiling point is only 1¼ hours.

The unit holds 12 gallons of solution which is its normal capacity of 15 gallons maximum. Four casters; 2 swivel type, 2 rigid; provide for easy maneuverability. The tank is ready for instant

operation upon plugging it in on 110 or 220-volt alternating or direct current.

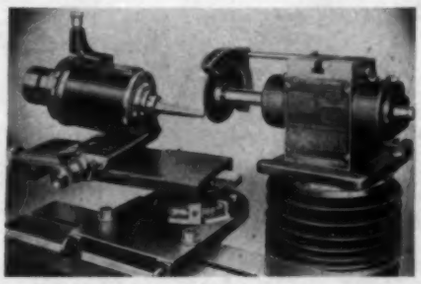
Heating element of the unit is located inside on the bottom of the tank where it is completely submerged. Standard equipment furnished with the degreaser includes two dipping baskets, in which the parts are placed, each measuring 11¾ x 11¾ x 8 inches; a bimetal type thermometer registering a temperature range of 100 to 600 degrees Fahr. and a thermostatic control of the rigid, shockproof type, equipped with a dial and knob to shut off the heating element manually and to maintain automatically any desired temperature between 100 to 550 degrees Fahr.; also a draw-off cock for emptying the tank.

To reduce heat loss to a minimum and enable the operator to get a quicker start in the morning, the steel tank is insulated all around the inner shell. The electric heating element can be removed whenever any cold solutions are used or the botton of the tank is to be cleaned. The head of this element as well as those of the thermostat and thermometer are mounted to the rear head of the tank so that they are protected against damage.

Grinding Attachment

Cincinnati Milling Machine Co., Cincinnati, is offering a new radius grinding attachment designed especially for use on its No. 2 cutter and tool grinder. Known as the No. 1 size, it grinds a wide range of cutters facilitating the grinding of ball-end cutters and die sinking cutters.

The attachment has two slides, each having longitudinal and transverse adjustment of the work with respect to the grinding wheel. A large diameter anti-



friction pivot in the base promotes smooth swivel motion, and is arranged so the slides may be swiveled as a unit through 360 degrees.

Incorporated in the base are movable stops having screw adjustments which accurately limit the swivel motion to the desired amount. The index plate at the rear of the work-head spindle of the unit has 24 notches. With this device, the attachment will handle straight flutes,

SPEED TREAT STEEL

A MEDIUM HIGH CARBON OPEN HEARTH PRODUCT

ONE

Steel that gives you . . .

1. EXCELLENT MACHINABILITY
2. GREATLY EXTENDED TOOL LIFE
3. GOOD FINISHED PARTS . . .
4. HIGH PHYSICAL PROPERTIES
5. EXCELLENT IMPACT RESISTANCE
6. GOOD TORSIONAL VALUES . . .
7. MINIMUM DISTORTION . . .
8. FINE HEAT TREATABILITY

ACTUAL PHOTOGRAPH
Speed Treat Steel (.45 carbon) 1-inch cold drawn bar tied in a knot, cold, without fracture.

SPEED TREAT STEEL machines from 30% to 60% faster than other comparable steels such as 1035, 1040, 1045 and 10% to 25% faster than such steels as X1335 and X1340 . . . with a very HIGH finish and greatly increased tool life.

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WRITE US FOR DETAILS
Our metallurgists are at your service

Licensor
MONARCH STEEL COMPANY
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Licensee for Eastern States
THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO
PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

If we are to keep pouring hot lead into the Axis, there must be no letup in the scrap metal salvage drive. The mills must have 45 million tons of scrap this year to produce the steel required in 1943. This means practically continuous peak production. To do it everyone must salvage scrap because regular sources of supply are insufficient. There's still plenty of scrap around the factories, farms, garages, and homes of the country, waiting to be put to work. Dig it up and sell it to a junk dealer who will send it to the mills for processing. Don't wait—the need is urgent—the mills must have a continuous flow of extra scrap.

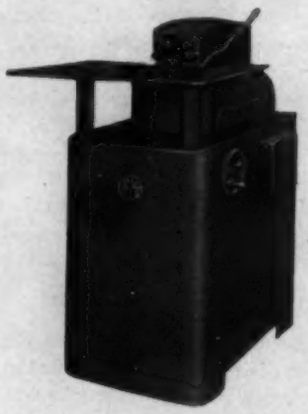
The mills are asked to produce 90 million tons of steel in 1943. Every ton of steel takes 1000 pounds of scrap metal. Are you doing your share in the scrap metal salvage drive?

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

cutters having 1, 2, 3, 4, 6, 8, 12 and 24 flutes, without the necessity of a tooth rest. When grinding cutters with helical flutes, the universal tooth rest supplied with the machine may be used.

Flanging Machine

Riverside Machinery Co., 10632 South Michigan avenue, Chicago, has introduced a new metal flanging machine known as the Riverside Multi-Flanger, which handles sheet metals of almost any practical gage and work on straight edges or around unusual shapes such as the edges of disks or around inside and outside edges of circles. The length of the forming operation is unlimited and the metal is not scored, marked or mutilated in any way, it is claimed. Economy and ease of operation are stressed



due to the fact that small, inexpensive dies are used with the Multi-Flanger which are quickly interchangeable. This makes the machine flexible in changing from one job to another. The head is adjustable to provide a wide range of operations. All the metal forming work is done by the machine thus providing safety to the operator whose hands are free to manipulate the material. No special skill or experience is required to operate the machine. Installation requires 4 square feet of floor space.

Electronic Meter

General Electric Co., Schenectady, N. Y., is offering a new electronic time-interval meter for measuring extremely short intervals—as low as 100 microseconds. Specifically, it is designed for measuring the time interval between two events which can be converted into electrical impulses, such as the elapsed time between the closing of two controls; between two impulses to a phototube; and between an electrical impulse and a light impulse.

Consisting of two units—an electronic panel and a photo-tube with its pre-amplifier stage—the meter has eight ranges. These are selected by means of a tap switch so any time interval of a

length between 0.0001 second and 3 seconds can be measured. A standard indicating instrument calibrated in milliseconds gives a direct reading of the time interval measured.

The normal input signals consist of changes of light intensity falling on the phototube or the making of external electrical contacts. In the former case, light values as low as 1/100 lumen, or an intensity of approximately 1.4 foot-candles, can be used on the photo-tube.

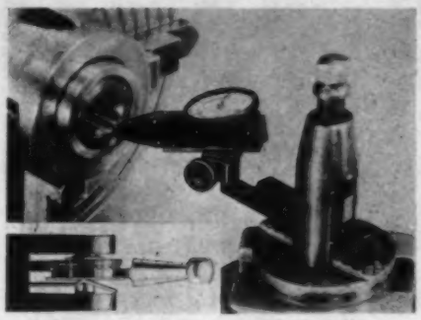
Operating from a 115-volt, 60-cycle lighting circuit, the meter is stabilized so that normal line-voltage variations do not affect its accuracy, which is 2 per cent of full scale value, it is said.

Improved Indicator

Federal Products Corp., 1144 Eddy street, Providence, R. I., is offering a new Testmaster indicator featuring a new ratchet compact point. The new index point now incorporated locks in place, but can be removed for replacement at any time, if desired.

Point can be set at any angle and its direction of operation reversed. Ratchet serrations mesh positively. The point is chromium plated. It is long and small enough to get into hard-to-get-at recesses.

The unit itself is ruggedly built for production inspection as well as exceptionally adaptable to the multitude of tests required in general machine shop



and tool room operations. Dovetail slides and universal clamp make the Testmaster easy to set and insure rigid support. The dial rotates for quick setting.

Screw Machine

George Gorton Machine Co., Racine, Wis., announces a new 16-A precision automatic screw machine, an American development of the famous Swiss Peterman P-7, modernized and improved. It is capable of turning out pinions, shafts, screws and small slender parts used in clocks, meters, radio equipment, precision instruments, guns and aircraft engines.

Diameters from 0.005 to 7/16-inch and lengths from 1/32 to 2¾-inches dem-

3 ODD ONES — To you they are just 3 ordinary bolts—to us they are 3 problems solved for 3 products and 3 customers. In fact no other bolt or stud is exactly like any one of these, yet all 3 have something in common with everything made for the war effort—that is the urgency of their need. We, at Erie Bolt & Nut, are geared to produce bolting to specifications on a 24-hour a day basis with Uncle Sam determining the urgency.

ERIE BOLT & NUT CO
ERIE, PA., U. S. A.

onstrate the wide range of work which the machine produces. In addition to step and contour turning and chamfering, the machine, with attachments, automatically performs centering, drilling, threading and slotting operations. It produces an extremely high finish, usually eliminating subsequent finishing operations it is said. The 16-A differs from the conventional automatic screw machine in its basic principle of operation. Briefly, the operating method is as follows: The stock is fed to the 5-station multiple tool head by means of a cam, through a bushing and past the cutting tools which are stationary in the horizontal plane. Thus, *the side thrust of the tools is at the point of work support.* The five tools on the tool head are adjustable radially and axially by means of micrometer screws graduated in 0.005-inch. The tool holders will accommodate tools up to 5/16-inch square.

The nitrided steel spindle is enclosed in the semi-nickel steel headstock mounted in a scraped and gibbed slide on the bed. Tool marks on the work are eliminated by the flat endless woven drive belt. Stock is fed through the guide bushing into the tools, all longitudinal feeds being accomplished by feeding headstock forward as a unit, with bar held in spindle collet in the usual manner. The Planex cam controls these movements, both forward and back. Synchronizing this longitudinal cam movement with cams which control the lateral movement of the tools permits generating any desired shape with single-point tools.

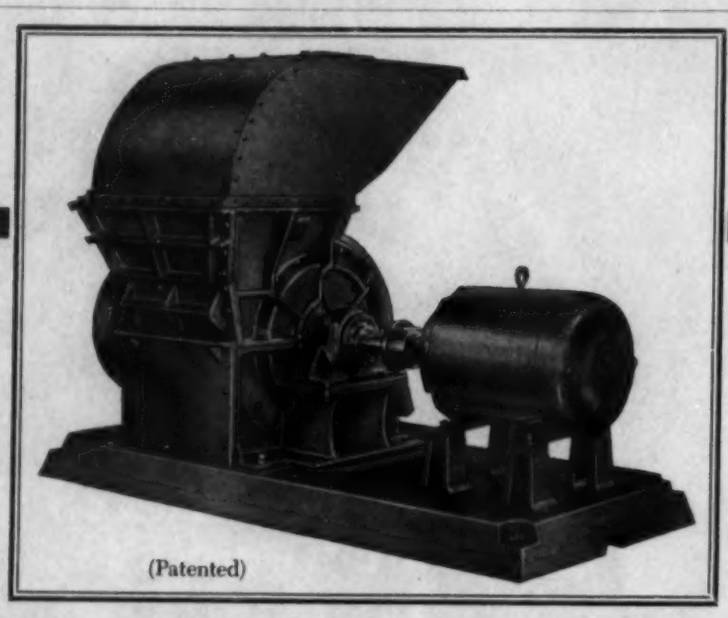
All cams are mounted on a single shaft at rear of machine. Being conveniently accessible, adjustments and changes of setup can be made easily and quickly. A hand wheel is provided at front of machine to disengage camshaft drive and provide manual control for setups. Electrical interlocks prevent camshaft motion when spindle is not turning, eliminating the possibility of tool breakage. All controls, dials, adjustments, etc., are conveniently accessible to operator at hip height. Hand hole-covers are provided in base for easy inspection of all internal mechanism, when desired.

Infinite variation in spindle speeds, from 1100 to 10,000 revolutions per minute, is provided by a Reeves variable speed drive. A 2-speed ball bearing motor (2 and 1 1/3 horsepower) drives the spindle through the Reeves unit.

The gear-type coolant pump and ¼-horsepower motor are mounted as a unit in a separate compartment at rear of

machine. The entire unit is conveniently removable for inspection and easy cleaning. The 12-gallon reservoir has a removable pan, baffles and strainer. A shut-off and relief valve on the pressure line and a filter on the intake also are provided.

The three-spindle attachment mounts on base in front of tool frame. It centers, drills, then threads the piece, either internally or externally. Threading spindles work on a speed differential system, eliminating necessity of stopping work spindle, or of providing special headstock speeds for threading operations. Threading with open diehead also works on a differential principle. Diehead is actuated toward material under cam action. When diehead arrives at end of threading, a screw stop opens die. Cam permits spring return of spindle. Diehead is closed by a trip lever. A built-in automatic 5-digit counter registers production quantities. A stock supply signal automatically stops



(Patented)

THE AMERICAN RING TURNINGS

CRUSHER

Utilizing the famous rolling ring principle of crushing, this crusher reduces long curly turnings of low or high carbon steel, alloy steel or brass into "Chips" as the turnings are fed into the feed hopper. Turnings cease to be a bother after you put the proper size American Ring Turnings Crusher on the job; it even pays for itself before you know it. These crushers are not an experiment: they reduce the toughest turnings, and are built to withstand severe requirements. Made in various sizes for various needs. You are invited to take advantage of our free consultation service.

THE RINGS ARE THE WHY

AMERICAN PULVERIZER CO.

1539 MACKLIND AVE., ST. LOUIS, MO.

machine when stock limit is exceeded, and flashes a red light indicating that re-stocking is necessary.

Frame Bender

Watson-Stillman Co., Roselle, N. J., announces an improved, portable, ship-frame bender, particularly adaptable for shipyards. Its distinct feature is the new overhead swivel connection to the power source, eliminating the clumsy and involved hose connection to a central accumulator.

The machine, mounted on wide, swivel-mounted castors, can easily be moved about on deck or on the ways. It is completely enclosed and self-contained, including a 3-horsepower motor, producing either 41 or 5 gallons per minute, using hydraulic medium oil. The entire unit measures 2 feet 7 inches from handle to handle, with an overall height of the same dimensions. The machine weighs 1,100 pounds.

Heat Treating Shot

(*Continued from Page* 91)

series of eight each to correspond with the loading of the conveyor of the hardening furnace. See details of these cages in Fig. 4. The shot move intermittently through the quench tank, then discharge onto a slide leading to the draw furnace. The quench tank conveyor is operated in timed, adjustable cycles by an air cylinder pusher mechanism operating through a chain and sprocket drive.

Houghto-Quench is the oil used, providing a rapid rate of quenching speed. Both jet and still quenching are provided. Quenching oil temperature is controlled by heat exchangers through which the oil is circulated. The rapid heat absorption provided by the quenching oil assures proper hardening.

The Draw Furnace: Two types of air draw furnaces are in use for the six-hour stress relief draw that follows the station quenching.

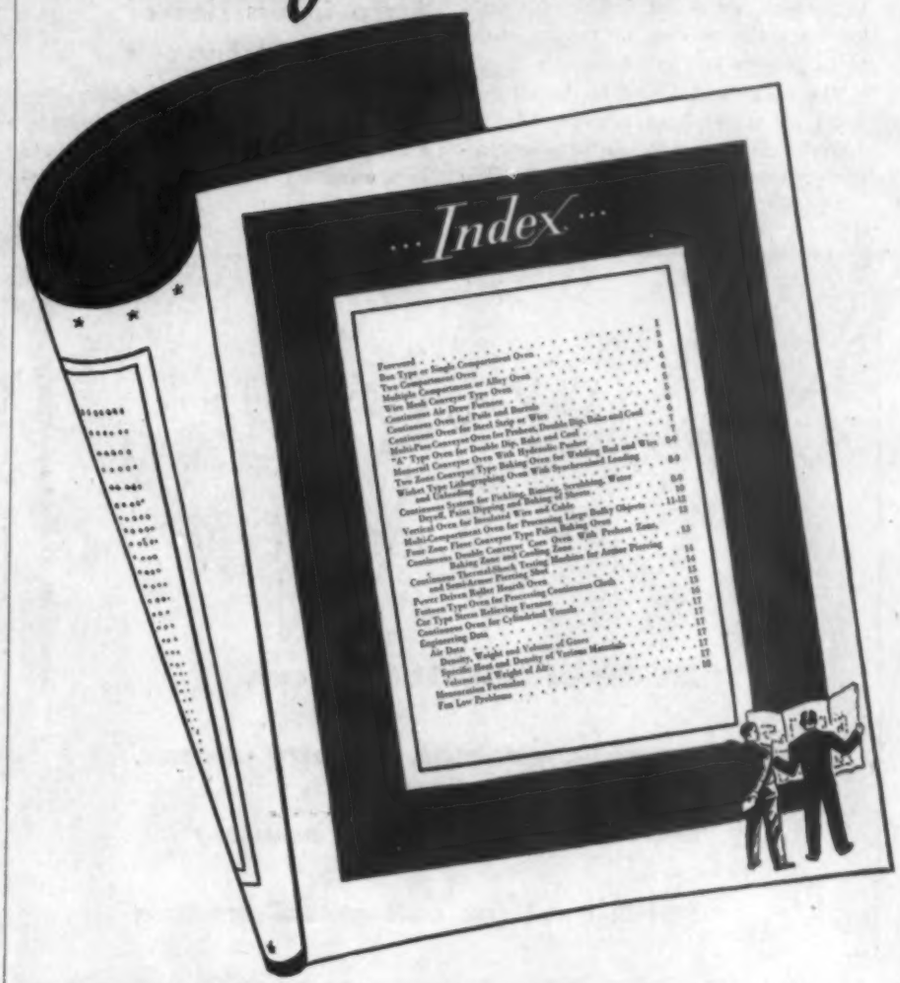
The first is the continuous recirculating air draw type. The shot is carried along on a conveyor belt made of heavy channels carried on two belts driven by an electric motor through speed reducer and variable speed pulley.

To circulate the hot air, two fan systems, each with its own combustion chamber, are built on the top of the furnace, and provide a complete change of air 50 times per minute.

This furnace is equipped with air flow switches and fuel shut off valves for safety purposes as well as spark ignition pilot burners for automatic lighting. From this air draw the shot are unloaded manually and placed in trays or con-

(*Please turn to Page* 133)

ENGINEERING *Information*



ON HIGH PRODUCTION OVENS

A limited number of copies of our engineering manual, "Blueprint for Industry — Part II", are still available to executives, engineers and research men. This publication covers basic engineering information on all types of standard and special industrial ovens for process and heat treatment. Special emphasis is placed on automatic handling and related attendant-saving accessory equipment.

Write for your copy on your letterhead.

The
INDUSTRIAL *Oven Engineering* **COMPANY**
Engineered Industrial Ovens • Special Handling Equipment • Contract Engineering
11621 DETROIT AVE. CLEVELAND, OHIO

Offers New Paint Stick Marker for Metals

"Real paint in stick form" is the description of a new Markal S paint stick recently developed by Markal Co., 6 East Lake street, Chicago, for use on all cold surfaces, especially steel. It is said to produce permanent, fadeproof, weatherproof markings even on rubber, stone, glass, plastics and other surfaces.

The stick can be used for layout purposes on steel plates whether bare or coated with zinc chromate or other protective coatings used in pickling. The marks dry sufficiently immediately after application so parts can be handled without smearing.

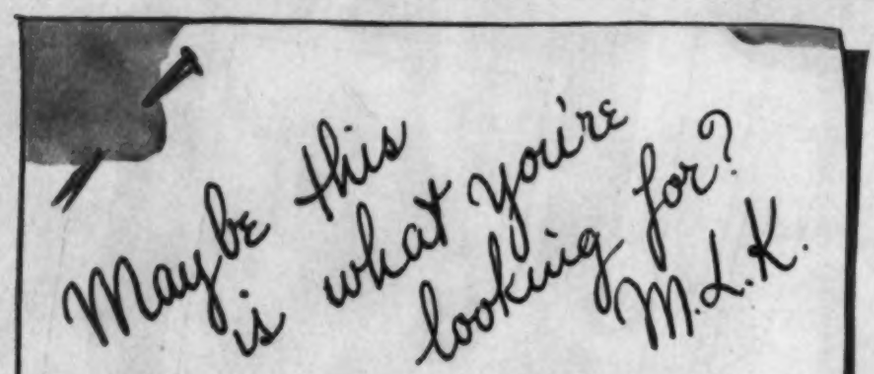
Choice of six colors is being offered by the company—red, white, green, blue, yellow and black. All of these dry thoroughly in about 10 minutes, it is said.

Ferro Offers Line of Priority-Free Enamels

A new, improved line of priority-free porcelain enamels is announced by Ferro Enamel Corp., Cleveland. Finishes in the Victory line are especially combined to meet present-day steel conditions, the company states.

Ideal for one-coat applications, ground coats are said to be extremely workable and fuse well with metal. Cover coats feature better workability, greater freedom from tearing and hair lining, improved gloss and more uniform color. Brown ground coats also feature good workability and single coats provide a durable finish even when used on lower grades of steel, Ferro reports.

Two new inorganic finishes, Chemroc and Hi-Chemroc, for coating cast iron and sheet steel, and coating corrugated roofing, ship partitions and architectural porcelain parts respectively also are being offered by Ferro. These are being offered along with a new line of victory colors free from priority restrictions.



KEMP of BALTIMORE can provide, on high priority orders, industrial immersion heating (with gas) for soft metal casting and for lead and salt bath hardening and annealing. Exclusive Kemp gas-air premixing guarantees high speed production, fuel saving, automatic, accurate temperature control.

For details address The C. M. Kemp Mfg. Co., 405 East Oliver Street, Baltimore, Md.

Offers Cream for Industrial Dermatoses

Various skin disorders are said to be eliminated with the use of Tarbonis cream, a modified tar product based on a formula developed in a famous medical institution, and now being manufactured by Tarbonis Co., 1220 Huron road, Cleveland.

Released for commercial use only recently, the product is recommended where there is occupational dermatoses whether due to chemical irritation, chronic exposure to abrasives, work with cutting oils, reagents, acids and many other conditions.

The cream itself is greaseless, clinically non-allergic and non-irritating, may be used safely by the worker at home as well as dispensed in the plant.

Lincoln Foundation Award Studies To Be Published

New information on arc welding is soon to be made available by James F. Lincoln Arc Welding Foundation in the form of a 1200-page book containing 98 of the outstanding award studies submitted in the foundation's 1940-42 Industrial Progress award program, the foundation revealed recently.

The volume, entitled, *Studies in Arc Welding*, will make available accumulated knowledge and experience of more than 100 engineers, designers and others applying themselves individually to a specific design study involving arc welded construction.

While the majority of the studies to be published involve products of plants engaged in war production, the principles and practices reported in the papers will be of inestimable value in post-war uses of arc welding.

Flame Cutting

(*Continued from Page* 98)

the possibility of using an excess of pressure on any cutting job.

It is not impossible to reduce the total cubic feet of oxygen used per month in a large cutting establishment to two-thirds or even less, by establishing effective control of the oxygen pressures being used in the cutting department. Since oxygen is a relatively expensive raw material, the saving of a third, or one-half of the quantity being used, is a definitely important factor of economy.

As in the case of cutting tips and their uses, there are also charts available for the asking from almost all producers of flame cutting equipment which give cutting speeds and the pressures of oxygen required for certain types of jobs. These should be consulted by the foreman of the cutting department and kept available for quick reference.

Templets and Their Use in Mechanical Flame Cutting. One of the most important factors in mechanical flame cutting with units such as the ones shown in Fig. 5 is the use of templets to control the outline of the pattern cut by the flame. For the cutting of certain shapes such as a circle, many of the multiple head flame cutting units now on the market can be set to automatically describe the shape desired, thereby eliminating the cost and the care of special templets. Long straight cuts, regardless of whether they are made lengthwise, crosswise or at a diagonal across the machine bed, can be made with a simple long straight edge to automatically guide the torch along the cut.

Wherever it is possible to use either a simple circular cut or a long straight cut which can be made with a straight edge, the cutting operation is made much simpler and usually is done more accurately.

In making long cuts on narrow pieces, such as when ripping narrow pieces from a plate, the distortion resulting from application of heat to one side of the piece often causes serious misfits. Experience has shown that an excellent way to eliminate this trouble is to leave the ends of the piece uncut for the last few inches as shown in Fig. 3, which diagrammatically represents the cutting of long slender pieces from a plate. Then after cooling, a hand torch or one of the torches from the multiple flame cutter is used to cut the pieces apart. Most of the distortion will thus be eliminated. The reason this method eliminates distortion is that the strips are not cut completely apart and so are not allowed to spring before the counterbalancing effect of the cut made on the other side of the part has a chance to balance the stress.

Much of the steel which is used in ordinary manufacturing of equipment or machinery can be cut cold. However, parts from high carbon steel are cut much easier when preheated to 400 or 600 degrees Fahr. In cutting hot, it is necessary to make careful calculations of the amount of expansion which the heat has caused so that when the parts are cool they will be shorter than the desired dimensions.

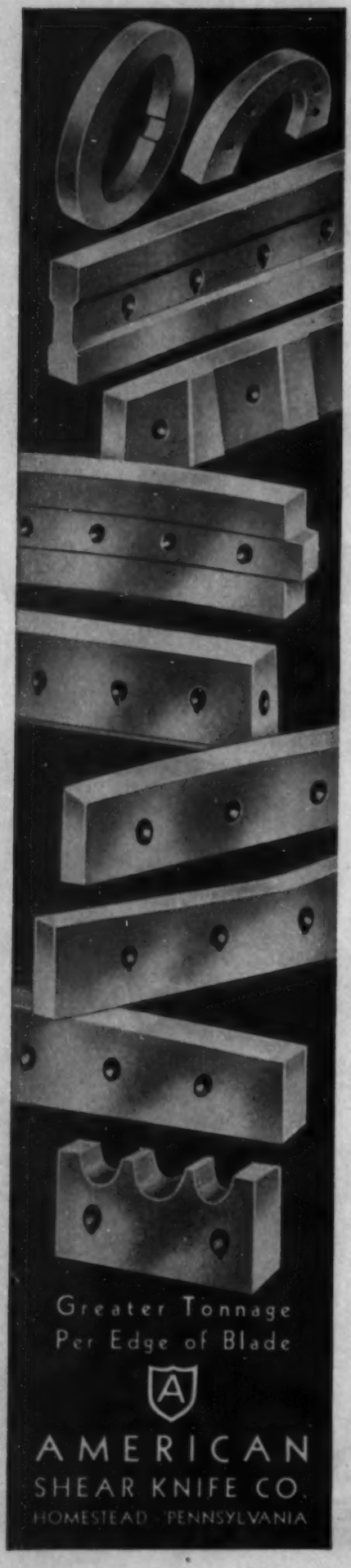
A large number of the parts which are being used in modern arc welding design are irregular in shape. Such parts require the use of templets of some sort if they are to be cut out on a mass production basis and to assure that each is a faithful reproduction of the originally specified part. There are many forms of templets. Three typical examples are shown in Fig. 4.

Each of these in Fig. 4 lends itself to different applications. The heavy cardboard templet at the left may be used for a relatively small number of parts which may be traced on the multiple-torch mechanical flame-cutting machine, or may be used for the marking and laying out of parts to be cut with a hand torch.

The wooden templet with the metal lining, upper right Fig. 4, is used for the production of large numbers of parts

KINNEAR MOTOR OPERATED WOOD ROLLING DOORS OFFER 2 WARTIME ADVANTAGES

1 MOTOR OPERATION! Kinnear Motor Operated Wood Rolling Doors can be opened or closed quickly at the touch of a button, from any convenient location! The rugged, heavy-duty motor does the work, saves time and labor.
2 COILING, UPWARD ACTION saves valuable floor, wall and ceiling space. It keeps the doors out of the way and safe from wind or traffic when open.
Strong inter-lapping wood slats form a rugged curtain that blocks out wind and weather, yet presents a neat appearance that harmonizes with any building exterior or interior.
Kinnear Wood Rolling Doors also assure highest economy of war-vital metals!
They are built in any size, for use in old or new buildings, and are available with manual control only, if desired. Write for complete data or specifications. The Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, Ohio.
SAVING WAYS IN DOORWAYS
KINNEAR
ROLLING DOORS



which are regular production items not subject to frequent changes. The guide wheel of the mechanical flame-cutting unit rides on the raised metal edge. This is the type of templet used for the production of the largest portion of the flame cuts in the modern factory.

The steel templet, lower right, lends itself best to the laying out by hand of large parts which are cut on a production basis by hand, where the problem of spacing certain cuts with reference to the other parts on the plate is very important. Such a steel templet greatly reduces the amount of time required for laying out a part prior to flame cutting it by hand. It is a great convenience to the operator who can place the rigid and permanent steel templet on the plate to be cut, locate it from some one starting point, and proceed to make it out with no fear of it becoming bent, moved, shrunken, or otherwise out of adjustment.

Probably the most important requirement in making templets for flame cutting is that they be sufficiently durable to maintain their shape and form for as long as they are required for that job, or for a reasonable life; and that they be an exact reproduction of the parts which they are to produce, with appropriate allowances made for operation of the machine so as to compensate for its inherent limitations to the end that the templet produces a perfect part.

Templet making is one phase of engineering flame cutting work where any additional effort expended to get perfect accuracy and minute detail may pay exceptionally large dividends. Hurriedly made templets or those made without proper regard for the minute details of the requirements of the job often are tremendously costly in increasing expense of fitting up parts during assembly and in welding up gaps caused by parts that fit badly.

By the same token, templets found to be inaccurate should be carefully corrected whenever an irregularity shows up continually in fitting up the parts. While permanent templets may be relatively expensive, it is much less expensive to make them over or correct than to continually lose money in time and labor required to correct the misfits which the defective templet may cause.

(Concluded Next Week)

Insulating Cement Has Non-Corrosive Qualities

A new non-corrosive insulating cement which prevents the rusting of metal surfaces which it contacts is reported by Baldwin-Hill Co., Trenton, N. J. It is of high-temperature resisting black rock wool, and is said to be effective up to 1800 degrees Fahr.

Check—Mr. Webster

"SUPERIOR—
EXTREMELY EXCELLENT
OF ITS KIND; SURPAS-
SINGLY GOOD . . ."

CHECK HOT AND COLD ROLLED STRIP STEEL

CHECK CARBON AND ALLOY . . .

CHECK STAINLESS and SUVENEER CLAD METAL

YOUR INQUIRIES ARE INVITED

SUPERIOR
STEEL CORPORATION
CARNEGIE, PENNA.

Sintering—Plant Design

(*Continued from Page* 104)

volume of waste gas is a variable and an increase in volume increases the velocity of the flow through the fixed dimensions of the gas disposal system; hence, the abrasive action of the entrained solids is increased to the extent of the additional impact imparted to them by the higher velocity.

Both dry and wet methods of handling waste gas through the disposal system are in use. While both are practical within limits, neither can be said to be wholly satisfactory. The opinion is offered that a combination of the two with the wet method fully completed would solve most of the problems in this part of the sintering operation.

The dry method of gas disposal utilizes the principle of the dust catcher which is simply a decrease in the velocity of the gas stream and a settling of a part of the entrained solids. The limit of efficiency is the pull of the velocity of the checked gas flow against the force of gravity in their action upon the entrained solids. There is always a percentage of extreme fines which carry over and exert an abrasive action on the fan blades, causing operating delays and maintenance charges.

Two Methods Are Employed

The wet method attempts to wet the entrained solids in the gas stream as the gas passes through the wind box, by water spray or by impingement on water.

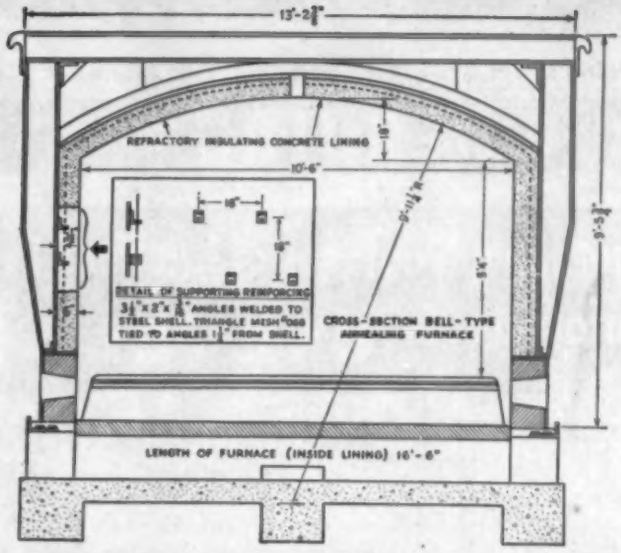
This method is successful to a degree but the amount of water which may be used is limited to the amount which will not cool the gas to the temperature at which there will be condensation of water vapor contained in the gas.

With the condensed water vapor, or any mechanically entrained water in the gas stream, the formation of sludge is inevitable and the deposition of sludge on the fan blades is dangerous to the balance and operation of the fan. Where the wet method is used the usual practice is to hold the temperature of the gas to approximately 250 degrees Fahr.

Construction of a gas washer between the wind box and the fan would permit a combination of the wet and dry methods and the recovery of their full values. With maximum recovery and the circulation of the dry dust from the dust catcher, or wind box, the gas passing to the washer could be thoroughly cleaned and cooled to the temperature of the available water. The governing factor in the use of a gas washer in the sintering plant operation would be the ability to eliminate the entrainment of sludge in the gas stream after the gas had passed the cleaning elements. The water vapor content of the washed gas would be lowered to that of saturation at the lowered temperature and the weight of the gas would be lessened to the extent of the amount of water vapor condensed. In an operation producing 1000 tons per 24 hours that reduction in weight would be approximately 100 tons. The reduction in the temperature of the gas would change the fan characteristics and the capacity of the fan would be increased.

Abrasive action from solids entrained in waste gas has been a serious operating difficulty with plants sintering flue dust or magnetite concentrates because the fines of both of these materials are hard in structure. The plants which use a major percentage of soft hematite ores will not have nearly as much trouble because with the adhesive characteristic of these ores there will be less fines sucked through the grates and the soft flocculent fines of these ores are not as abrasive as the hard fines of the other materials. In a few cases

JOINTLESS LINING SAVES HEAT IN ANNEALING FURNACES


REFRACTORY INSULATING CONCRETE LINING
DETAIL OF SUPPORTING REINFORCING
CROSS-SECTION BELL-TYPE ANNEALING FURNACE
LENGTH OF FURNACE (INSIDE LINING) 16'-6"

Refractory *Insulating* Concrete Speeds Installation, Reduces Maintenance

The first of 12 bell-type annealing furnace covers in a large steel mill was lined with Refractory *Insulating* Concrete, made with LUMNITE, about two years ago. In addition to low first cost, the linings offer these advantages:

EASE OF INSTALLATION—The furnace cover is inverted. The mixture of LUMNITE, refractory-insulating grog and water, is cast in place. Arch is placed first; then forms are set and side and end walls are cast.

SAVINGS IN MAINTENANCE—The monolithic lining resists the strain and shock of lifting and dropping in place. There are no joints to loosen or small units to drop out.

SAVINGS IN OPERATION—Absence of joints increases efficiency of insulation. Low heat-storage and low conductivity save fuel in reaching and maintaining furnace temperature.

Refractory Concrete and Refractory *Insulating* Concrete, both made with LUMNITE, are meeting the wartime needs of many steel mills. We offer the help of our representatives in making the most efficient use of LUMNITE, which is now available only for service in essential war production. The Atlas Lumnite Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

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This new 16-page booklet can give you useful information about crane trolleys, end trucks, driving units, gear cases, cabs and lower blocks. "The WHY and HOW of Faster Production At Less Cost" shows *Reading Traveling Cranes* at work in plants like yours. It shows how they are helping to speed output and reduce maintenance troubles.

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the fan blades had to be sand blasted from time to time to remove encrusted ore fines.

VI—Sinter Handling

For use in the blast furnace the most important physical characteristic of sinter is the particle size and that size is governed by natural friability or by mechanical preparation. The natural friability of sinter is determined by the percentage and the molecular formation of the iron silicates formed during the sintering operation. Since the sintering machine operator does not have any control over the formation of the silicates and since the proper particle size of sinter is vital to the blast furnace operations, the final step in the production of sinter is sizing. If the product is naturally friable enough to break up to the preferred sizes it is an advantage, but if not, the preferred size can be had by crushing.

Conclusion

With the prospective large tonnage of sinter to be produced it seems reasonable to say that intensive thought should be given to the development of improved equipment to serve the foregoing fundamentals.

Raw material preparation should not be looked upon as a necessary evil but rather as an opportunity to increase tonnage and lower overall costs. The proper relation of particle sizes of the components of the mix is the factor which determines the uniform permeability of the mix to air and gas. Resistance to gas flow without restriction to flow determines the efficiency of the transmission of heat from the gas to the raw materials. Uniformity of shrinkage in the sinter cake determines the amount of foul air which can infiltrate through shrinkage cracks and increase the power load on the exhaust fan. With proper preparation of raw materials and return material to prevent segregation of particle sizes when the mixed mass is delivered to the sintering hearth, the bed of material will be more uniformly permeable to air and can be increased in depth in proportion to the increase in that uniform permeability. The depth of bed is most important. Since it is impossible to maintain a perfect vacuum there will always be more or less leakage of foul air through shrinkage cracks and seal leaks, but for any given hearth, the seal joint is no longer with a bed 16 inches deep than it is for one 12 inches deep. If the materials are prepared so that a 16-inch bed can be carried the ill effect of any leak will be reduced proportionately and production would be increased 33-1/3 per cent. Design and arrangement of equipment for better preparation of raw materials appear to be av-

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enues for the development of the sintering plant of the future.

Maintaining the seal joint as tight as possible is most important. The bed of material will offer some resistance to the passage of air but a leak in the seal joint will not offer any resistance; consequently, the entrance of foul air is out of proportion to the size of the opening. An improved seal, which can be maintained at maximum efficiency, will contribute to the effective use of fan capacity.

Feature of New Design

The Agnew sintering machine designed to lower installation, operating, and maintenance costs is a recent development. The design introduces the feature of an endless train of unitary cast pallets sliding in abutting relation over stationary rollers and guided around the curved end sections by curved surfaces bearing on curved sections of roller trackway and applies to metal the well proven principle of the frictionless, free running, rubber conveying belt. The arrangement permits the installation of any desired permanent pressure lubrication system to all rollers and the water cooling of all roller shafts. With wheels attached to a pallet bottom sealing is obligatory, the seal is not readily accessible and the abutting point of contact between pallets are subject to wear as the pallets pass around the end sections of the machine. The stationary roller permits the seal joint to be located at the side of the pallet above the rollers and remote from the point of contact between pallets as they pass through the end sections of the machine; consequently, the surfaces to be sealed are not subject to wear and will remain true for the life of the pallet. The side location of the seal makes it readily accessible and easily maintained at maximum efficiency at all times. A single or double seal is optional. The practicality of the design has been demonstrated in model form but a full scale installation has not as yet been made.

Application of a gas washer to a sintering plant seems to be entirely practical. The principle of creating a vacuum by the contraction of hot gases has long been demonstrated by the jet and surface condensers of the steam engine. Application of the principle to the sintering operation would simply be a new place of application for a proven principle. The advantage to be expected would be increased efficiency in exhaust fan performance. Fan maintenance cost is a large item of the general maintenance costs. Clean dry gas would lengthen the life of a fan indefinitely. Since the fan characteristics are based upon volume, temperature, and speed, clean gas reduced in volume by cooling delivered to a small fan would make

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HOTEL CLEVELAND Cleveland

the small fan just as effective as a large fan handling a large volume of hot gas and the small fan would have the longer life. The principle is right, the reasoning seems correct, the application of both appears to be an avenue for development in the sintering plant of the future. The average temperature of the waste gas from a sintering operation will be approximately 350 degrees Fahr., the recovery of this thermal value for thawing frozen ore appears to be another avenue for development.

Importance of Particle Size

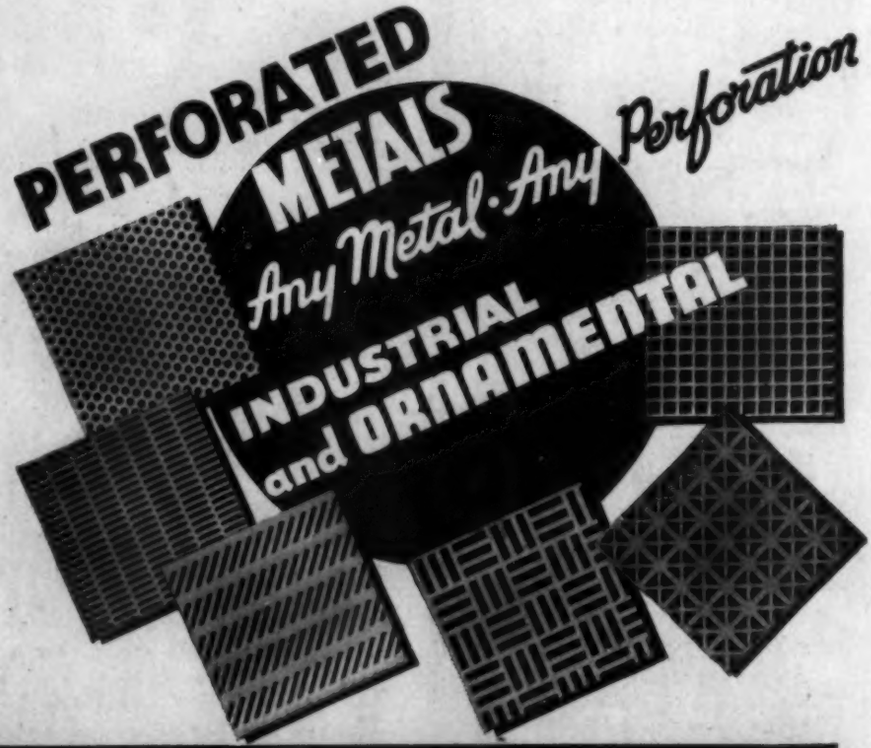
The attempt has been made to show the importance of sinter particle size in the recovery of the sinter values in the blast furnace operation. Where it is possible to select a mix which will give the preferred size no other equipment will be necessary but if there is no selection and the mix forms a sinter which is too large it must be prepared to a smaller size or the blast furnace operation using the sinter for a major portion of the burden cannot be economical. Obviously the amount of preparation will vary with sinters. The location of the sintering plant serving the furnace may determine the best location for the preparation equipment. The thought it is desired to convey is the importance of the sinter preparation, the need provides an avenue for development in the sintering plant of the future.

Wide Motor Speed Range

(*Continued from Page* 108)

matic sketch, (Fig. 2), represents a Mot-O-Trol system for 1 horsepower and smaller, using single-phase full-wave rectification on both field and armature. For motors of larger horsepower rating a two phase full-wave or three phase half-wave rectifier may be used depending upon the most economical application of tubes. Four pieces of equipment are involved; the small power transformer, for separate mounting on user's machine, the Mot-O-Trol cabinet proper, control station and direct-current motor.

When mercury vapor tubes are used an initial 5-minute time delay period is required for tube warm-up. However this time delay need occur only once after the line switch is closed since the control is designed to maintain continuous heating of the tubes at all times even when the motor is stopped, unless the line switch is opened or the low-voltage protection feature operated. The time delay relay contacts are in the field control and armature control circuits so that the "forward" and "reverse" push buttons are not effective until the initial warm-up period is over.



The Harrington & King PERFORATING Co.

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Heat Treating Shot

(*Concluded from Page* 125)

tainers for a three-day again period prior to hot and cold shock testing.

The second type of air draw furnace being used for this work is the basket type shown in Fig. 4. Here the shot are discharged from the conveyor and manually loaded into heavy welded steel baskets.

These draw furnaces hold a three-section basket approximately 30 inches in diameter by 30 inches deep. Each section of the basket holds approximately 60 shot. Special lugs lock the three sections of the basket together for loading and unloading the furnace, and later storing.

Heater Prevents Cooling

In loading the shot, the basket sections are placed in a special round insulated heater, to prevent the shot from cooling below the required temperature before being placed in the draw furnace. After three sections of the baskets are fully loaded, the entire basket is loaded into the furnace by means of a monorail hoist.

Circulating a large volume of air is necessary for uniform temperature in this type of operation. Thus fan capacity and power are important. Each unit has automatic temperature control, with complete safety equipment. These units are gas fired only, with open type burners.

The basket type air draw requires more head room or a pit and is best suited to main floor operation. Manual handling of shot is eliminated after the drawing operation since the shot are left in the basket sections for the aging period rather than being individually removed by hand.

The three installations cited on the foregoing pages are typical of mass production heat treating units now installed in many plants. Each installation must be worked out in co-operation with builders of furnaces and suppliers of heat treating materials.

Hardening furnace operating temperature can be controlled from 1400 to 1600 degrees Fahr., draw furnace temperature from 400 to 450 degrees Fahr. Time cycles vary with the loading of the hardening furnace but usually average approximately 12 to 17 minutes in the quenching oil. Timing cycle is specified in the drawing operation at 6 hours. Approximately one hour is allowed to bring the shot up to heat. These units are made to have a production of from 150 to 250 shot per hour.

The shot are then subjected to the standard water "shock test," then sand blasted and finish-ground.

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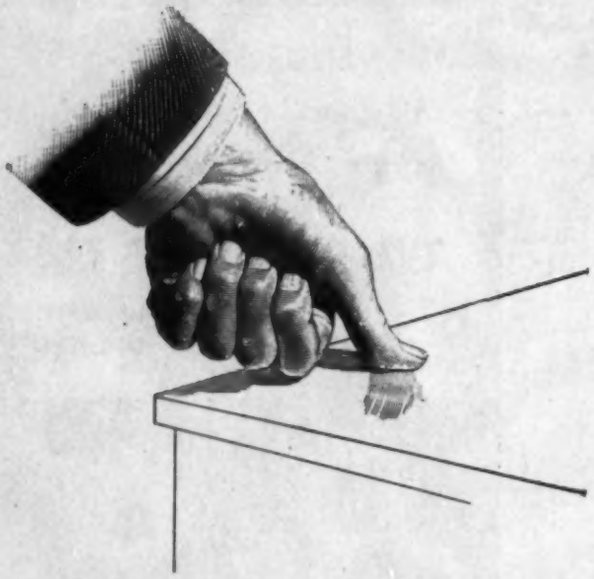

meet Enemy No. 1

Rub your thumb along your desk—*fast, hard!* . . . Feel the resistance—the heat? When you fight a mechanized war, *that's* the *first* enemy you have to lick—*friction!* . . . *Everywhere* the fight against friction is waged *without let-up.* It is a fight that *must be won* before we can even get at our enemies! . . . Perhaps no other single item plays so vital a part in the kind of war we fight today as the ball bearing. Without it, not a wheel would *keep* rolling—not a ship would *keep* sailing—not a plane would *keep* flying. New Departure ball bearings are helping to keep America's war machine rolling, sailing, flying on to victory.

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THE FORGED STEEL BEARING

3179

Steel Demand Grows as War Production Shifts

Mills find schedules constantly tightening. . . Ships and planes take largest part. . . Tin plate output increased for third quarter. . . Coke situation threat to pig iron production

DEMAND
Emphasis changes, tonnage gains.

PRODUCTION
Up 2 points to 98½ per cent.

PRICES
Ferroalloy schedules adjusted.

WHILE various steel consumers are forced to modify operations, due to reductions in some lines of ordnance, the fact remains that steel mill schedules continue to tighten.

Cancellations and suspensions in some war programs are being offset by increased consumption in others and qualified observers believe the stringency will grow, especially in view of increased needs when the invasion of Europe is under way.

Ships and airplanes continue to furnish the backbone of demand for steel and top all other war requirements, with extension of these programs scheduled to continue. While shipbuilding centers heavily on plates it also takes considerable tonnage of light shapes and is a factor in many other materials, wire rope, pipe and tubing, sheets, strip and bars. The extent to which subcontracting and prefabrication is used in ship work is illustrated by a recent award by an eastern shipyard of 40,000 tons of prefabricated work to subcontractors in its area. This class of work puts heavy burden on welding and flame-cutting departments.

War Production Board is said to be planning allocation of a million tons or more of steel bars for an important purpose not yet announced. Some new capacity will provide part of this tonnage and the remainder is expected to be obtained by reduction of allotments to claimant agencies for purposes considered less essential. Such an allocation would greatly add to tenseness of the bar market.

• • •

Steel production last week snapped back to 98½ per cent of capacity, renewed output of coal providing better coke and coke oven gas supply. Pittsburgh, hardest hit by the coal stoppage, regained 7½ points of the 8½-point loss and small increases at other points made up the difference. Pittsburgh's recovery made its rate 97½ per cent. Wheeling advanced 4 points to 90, St. Louis 2 points to 95, Birmingham 5 points to 100, Cincinnati 5 points to 93 and Detroit 4 points to 87. Eastern Pennsylvania lost 1 point to 94 and Cleveland ½-point to 94½. Rates were unchanged at Chicago and Youngstown, both at 97 per cent, Buffalo at 90½ per cent and New England 95.

Tin plate schedules for third quarter are being revised upward and present estimate of production in that period is 725,000 tons, with fourth quarter output probably about 500,000 tons. Several producers have filed a price of $4.65 per base box for plate carrying three-quarter pound of tin per base box, midway between hot dip and the thin-coated electrolytic. The new product is in the experimental stage, awaiting tests in actual use.

Effects of the coal stoppage and threat of a further strike is making the pig iron situation uncertain and although coke production is at capacity many blast furnaces are operating on close margin and further curtailment would cause banking of many units. Some melters in the East plan suspension of delivery for midsummer inventory and vacation periods.

On a showing of increased cost of material and labor Mystic Iron Works, Everett, Mass., has asked upward revision of its pig iron price beyond the $1 differential now allowed. In the highly competitive New England district any change in price is of much importance to consumers and to suppliers from other districts.

• • •

Manpower presents the greatest difficulty in the scrap market and some wage adjustments are under way to make the situation easier. Government agencies have been appealed to in an effort to obtain more workers and apprehension is felt in many quarters that scrap supply may suffer later in the year from reduced collections and inability to prepare material for shipment. Recent freezing of usable automotive parts has reduced tonnage from automobile wreckers and estimates from this source have been revised downward. Battlefield scrap from North Africa is arriving at Atlantic ports but the suggestion is that much of this will be shipped to Italy after that country is occupied, to augment output of steel from Italian mills for the United Nations.

Office of Price Administration has set up dollars-and-cents prices on ferrosilicon, ferrochromium and silicon and chromium metal. Three zones have been laid out, with differentials for delivery in each. Prices reflect those previously applying, with little change.

Composite average prices of steel and iron products, governed by Office of Price Administration ceilings, are unchanged. Finished steel composite is $56.73, semi-finished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	June 19	June 12	June 5	One Month Ago Apr., 1943	Three Months Ago Feb., 1943	One Year Ago May, 1942	Five Years Ago May, 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	23.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	11.60

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. **Semifinished Steel Composite:**—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. **Steelmaking Pig Iron Composite:**—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. **Steelworks Scrap Composite:**—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	June 19, 1943	April, 1943	Feb., 1943	May, 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.49	2.49	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.15	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to 5/16-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	June 19, 1943	April, 1943	Feb., 1943	May, 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.39	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.54	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.65	140.65	140.65

Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.50	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.

(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.

(Andrews Steel Co. may quote carbon forging billets $30 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.

Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10; Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.80c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points. Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box $4.50-4.65.
Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and Cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	.67
Do., 11 gage and heavier	.70
Barbed wire, 80-rod spool, col.	.70
Twisted barbless wire, col.	.70
Single loop bale ties, col.	.59
Fence posts, carloads, col.	.69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63¼	51	1-1¼	34	16
⅝	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine	
½ x 6 and smaller	63½ off
Do., ⅞ and ⅝ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off
Stove Bolts	
In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.	

Nuts	U.S.S.	S.A.E.
Semifinished hex.	62	64
⅞-inch and less	59	60
⅛-1-inch	57	58
1⅛-1½-inch	56	..
1⅝ and larger		

Hexagon Cap Screws	
Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off
Square Head Set Screws	
Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*$6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943.
†$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.60	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.34

(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00-28.00
Do., barge	25.00-28.00
No. 2 lump	25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.33; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers plants, freight ton lots 15.00c, less-ton lots 15.25c, allowed; 1% iron; carlots 14.50c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; less 200-lb. lots 6.80c. Spot prices ton lots 6.30c; less-ton lots 6.55c; ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents up.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ¼-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.00c; ton lots 10.50c, less ton lots, 11.00c.

Boronil: 3 to 4% boron, 40 to 45% Si., $7 lb. cont Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound. Delivered Locally, Subject to Prevailing Differentials.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled bands (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2500 series	AISI hot bars 3100 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	7.762[23]	6.062[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[11]	4.774	.....	.....
Jersey City	3.853[1]	3.747[2]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[11]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[15]	4.072[11]	4.772	7.566[23]	5.866[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[15]	4.052[11]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[15]	4.041[11]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[14]	4.165[11]	.....	.....	.....
Bethlehem, Pa.*	....	3.45[1]	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[18]	4.30[15]	3.75[11]	3.52	7.35[23]	5.85[23]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[15]	4.20[15]	3.65[11]	....	.....	.....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[18]	4.00[15]	3.65[11]	....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.00[15]	3.65[11]	..	.....	.....
Cleveland (city)	3.25[1]	3.58[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[15]	4.05[15]	3.75[11]	3.20	7.35[23]	5.85[23]
Cleveland (country)	3.25[1]	3.58[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[15]	3.95[15]	3.65[11]	....	.....	.....
Detroit	3.45[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.68[1]	4.84[15]	4.30[15]	3.80[11]	3.40	7.67[23]	5.97[23]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[15]	4.77[15]	4.42[11]	....	.....	.....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[15]	4.77[15]	4.42[11]	..	.....	.....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[15]	4.37[15]	4.00[11]	3.45	7.69[23]	5.99[23]
Youngstown, O.*	....	....	....	....	....	....	....	4.40[15]	....	....	....	....	....
Middletown, O.*	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[15]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[15]	4.10[15]	3.75[11]	3.50	7.35[23]	5.65[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[15]	4.00[15]	3.65[11]	....	.....	.....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[15]	4.23[15]	3.88[11]	3.54	7.33[23]	5.88[23]
St. Paul	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.50[1]	3.85[1]	3.85[1]	5.00[1]	4.35[1]	4.34[11]	3.83	7.70[23]	6.00[23]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[15]	4.24[15]	4.02[11]	3.61	7.72[23]	6.02[23]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[15]	4.25[15]	3.97[11]	....	.....	.....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[15]	4.00[15]	3.97[11]	....	.....	.....
Memphis, Tenn.	3.90[4]	3.95[3]	3.95[3]	5.71[4]	3.85[3]	4.10[3]	4.10[3]	5.25[11]	4.66[14]	4.31[11]	....	.....	.....
Birmingham (city)	3.50[3]	3.55[3]	3.55[3]	5.83[3]	3.45[3]	3.70[3]	3.70[3]	4.75[15]	4.78[14]	4.43[11]	....	.....	.....
Birmingham (country)	3.40[3]	3.45[3]	3.45[3]	5.83[3]	3.35[3]	3.60[3]	3.60[3]	4.75[15]	4.78[14]	4.43[11]	..	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[15]	4.95[15]	4.60[11]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[15]	4.95[15]	4.60[11]	....	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[15]	5.43[15]	4.50[11]	....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[15]	7.15[6]	5.70[11]	....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[15]	7.55[15]	5.55[11]	....	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[15]	7.45[15]	5.45[11]	....	.....	.....
Tacoma	4.20[4]	4.45[4]	4.75[4]	6.50[4]	4.65[4]	4.25[4]	5.45[4]	5.70[4]	6.63[14]	5.75[11]	....	.....	.....
Seattle (city)	4.20[4]	4.45[4]	4.75[4]	6.50[4]	4.65[4]	4.35[4]	5.45[4]	5.70[4]	6.63[14]	5.75[11]	....	....	8.00[3]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendments Nos. 10 and 14 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 500 pounds and over, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½%
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80

less $7 freight allowance

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	....	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.13-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	.....	.....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c. per pound on finished products and $54 per gross ton on semifinished steel- major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades							Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Foundry Steel 2 ft. and less	Foundry Steel 1 ft. and less			
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85										
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bandles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnaee or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1¼c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 15.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 14.50c; No. 12 foundry alloy (No. 2 grade) 14.50c; chemical warfare service ingot (99½% plus) 14.50c; steel deoxidizers in notchbars, granulated or shot, including ingot containing over 2% iron, Grade 1 (95-97½%) 14.75c, Grade 2 (92.95%) 14.50c, Grade 3 (90-92%) 14.00c, Grade 4 (85-90%) 13.50c, Grade 5 (less than 85%) 12.50c. Above prices for 30,000 lbs. or more; add ¼c 10,000-30,000 lbs.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62¼c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.30c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more; plant scrap only. Segregated 2s solids 10.00c, 11.00c, 11.50c; all other solids 9.50c, 10.50c, 11.00c; borings and turnings 7.50c, 8.50c, 9.00c; mixed solids 8.50c, 9.50c, 10.00c, mixed borings and turnings 6.50c, 7.50c, 8.00c

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Dollars, Cents Prices Set on Ferrosilicon

Office of Price Administration has announced specific dollars-and-cents prices for ferrosilicon and silicon metal, which in general maintain existing ceilings, at levels prevailing Oct. 1 to 15, 1941. A simplified zone system is incorporated in the order, with agreement with the industry and consumers. The order is maximum price regulation No. 405, effective July 1, when contracts usually are made.

Prices of most grades are quoted on the basis of contained silicon. The three zones consist of the eastern, including all Mississippi river points and points east of that river; central zone including territory west of the Mississippi river and east of a line formed by the western boundaries of New Mexico, Colorado, Wyoming and the latter extended north to the Canadian border; the western zone runs from that line to the Pacific coast.

The new prices include the following: Carloads, unpacked, eastern zone, 25 per cent grade ferrosilicon, 9.75c to 12.15c per pound contained silicon, according to crushed size; 50 per cent grade, 6.65c to 8.10c; 60 per cent grade, 7.70c to 9c; 75 per cent grade, 8.90c to 9.85c; 95 per cent grade, 11.05c to 12.45c. Silicon metal, 96 per cent silicon and 2 per cent iron maximum, 12.50c to 14.85c; 97 per cent silicon and 1 per cent iron maximum, 12.90c to 16.25c.

For central zone delivery premiums of .15c to .80c per pound of contained silicon may be added to eastern zone prices for carloads and 0.45c to 3.35c for less than carload lots. For western zone delivery premiums of 0.60c to 2c may be added to eastern zone prices for carloads and 0.90c to 11.05c for less than carloads.

Maximum price regulation No. 10, on pig iron, still controls the price of 15 per cent grade ferrosilicon not produced in an electric furnace.

Similar action has been taken by OPA on dollars-and-cents prices on ferrochromium and chromium metal, effective July 1, and the same zones are prescribed, in maximum price regulation No. 407.

Maximum base contract prices per pound for chromium contained, for delivery in the eastern zone in carlots, f.o.b. shipping point with freight allowed to destination, are: High-carbon standard grade ferrochromium, 13 to 14½ cents per pound chromium contained, according to crushed size; for high grade S.M. ferrochromium, 14 to 15½ cents, according to crushed sizes; high-carbon high-nitro grade, 18 to 19½ cents; high-carbon foundry grade, 13½ to 14 cents; low-carbon standard grade, specific prices for ten grades range from 19½ to 54 cents; low-carbon S.M. grade, 20 to 49 cents; low-carbon high-nitro grade, add 2 cents to low-carbon standard grade; chromium metal, 78½ to 99½ cents of chromium contained.

For delivery in the central zone premium of 0.04c per pound for carlots and 0.65c for less than carload lots is added to the eastern zone price. Premium for chromium metal is 1.5c for carloads and 2.5c for less than carloads above eastern zone prices. For western zone delivery premium over eastern zone is 1c per pound on carlots and 1.85c on less than carlots; on chromium metal the premium is 2.75c on carlots and 4.75c on less than carloads.

Plates . . .

Plate Prices, Page 137

A marked increase in plate buying recently reflects the further broadening in shipbuilding, particularly merchant ships. Two eastern mills are booked solidly through August, and another through entire third quarter. Other plate producers report a heavy portion of third quarter capacity scheduled, with growing backlogs beyond.

Tonnage going to warehouses in August will be based on the replacement schedule covering April sales.

By far most plates going to New England fabricators are for ships, punctuated by scattered demand for other war contracts. Requirements for flame-cutting remain heavy; backlogs for flanged and dished work are lower and deliveries are easier. Jobbers operating gas-cutting departments are absorbing a substantial part of their quotas in this work.

Although plate needs for boilers have been small, a fair sized order went to a Fitchburg, Mass., shop. Structural fabricators frequently consume more plates than shapes. For a deep drawing operation a Worcester fabricator with an aircraft sub-contract requires 100 tons a month of half-inch plates. Railroads are asking for little steel, but their requests for plates are frequently pared down. Undersea craft are taking a good part of the wider sheared sizes available.

Pipe . . .

Pipe Prices, Page 137

Demand for steel and wrought pipe has slackened, with some price shading as distributors file orders for third quarter requirements. Buying for industrial use has eased less than with plumbing and heating sellers. Although deliveries are extending as third quarter capacity is taken up, butt weld can be promised for July; lap weld in August and wrought pipe in three to four weeks. Prefabricating pipe shops are active on ship work and for oil refinery and rubber plant installations, although some easing in demand for the latter two is expected during second half.

Tubular products are tight, notably cold-drawn seamless. Mills producing aircraft grades are heavily booked, with demand mounting. No seamless one and one-half inch and under was permitted warehouses in second quarter, but for third quarter some mills are tentatively taking such tonnage, uncertain as to whether the ban on jobber shipments of these sizes covered second quarter only. Little capacity is open for numerous sizes before November delivery. An inquiry for 2000 tons of one-inch pipe for camouflage posts may be switched to welded carbon tubing.

Cast iron pipe buying is at a standstill in the East. Cast pipe foundries can make deliveries in two to four weeks and have fair stocks on some sizes. Limitations on pig iron allocations, however, prevent large inventories. Larger fittings and flanges are more extended than pipe, ranging from two to four months. Despite low demand for pipe, some foundries are heavily engaged in war work, including bombs and heavier equipment.

New England Stack Asks Price Relief

In New England some melters of pig iron are confronted with higher prices, for while the petition of the Mystic Iron Works, Everett, Mass., for an increase in its premium differential has not been acted on at this writing, analysis of costs imposed on that furnace by war-time conditions indicates an increase would be justified.

Ore, limestone and coke, labor and other factors entering into higher costs per ton are substantial, notably ore, and are well over the $1 premium permitted since April 20, 1942. No definite increase was asked in the petition submitted with data as to heavier costs.

Meanwhile melt is down with gray iron shops in New England, notably with jobbing foundries, and with pressure off in other directions higher pig iron prices are not welcomed by these consumers, who sell their castings at ceilings. The aggregate volume of iron required monthly is declining, but not sharply. Only in a few instances are melters concerned as to supplies and this is generally due to failure to ask for iron in time or in amounts to meet unexpected developments in demand.

A large potential demand is building up for manufacture of textile machinery, paper mill equipment and heating shop requirements. While some restrictions on these have been lifted slightly, heavier demand for pig iron has not as yet been forthcoming. However, all these industries are melting less than during peacetime and with postwar markets accumulating, the eventual demand for pig iron will be large. Once relieved of restrictions textile mill equipment builders especially will need iron; this group ordinarily buys heavily in advance and stocks large inventories as a rule.

Kaiser Bids on Navy Iron

Among bids on 1799 tons of foundry pig iron for delivery to various navy yards, the larger tonnages for Brooklyn and Philadelphia, was one from the Kaiser Co., iron and steel division, Oakland, Calif., quoting on west coast deliveries. Low on the inquiry for deliveries at Oakland and Mare Island, however, is Columbia Steel Co. on a delivered basis and f.o.b. Ironton, Utah.

Pig Iron . . .

Pig Iron Prices, Page 138

Pig iron situation remains virtually unchanged in the Pittsburgh district. It now appears this number of furnaces will continue to operate until later this year when it will move up slightly as a result of new construction. Stacks now out for repair will be brought in and others taken out on a fairly stable schedule. Several new stacks are building in the Pittsburgh district, at least two of which should start melting iron within the next few months. Meanwhile, the threat of a coal strike persists and it is possible that another large tonnage will be lost before final settlement is made. Although coke production is at capacity it is impossible to build up stocks and furnaces are operating vir-

tually hand to mouth on coke.

In eastern Pennsylvania melters are exerting little pressure and some foundries have asked for suspensions of a week or more while inventory is taken. It also is believed likely some foundries will close for vacations during the week preceding the July 4 holiday.

Sheets, Strip . . .

Sheet & Strip Prices, Page 136

Only in spots are sheet producers able to take cold or hot-rolled orders for August delivery, with third quarter capacity about filled; mills supplying the drum demand generally are sold beyond, into November in at least one case. Delivery balance as between hot and cold-rolled has narrowed, generally due to lower issues and a mild spurt in orders for the latter. Galvanized is available for late July shipment.

In New England warehouse demand is steady, but direct buying fluctuates with the trend in war contracts, with shipyard requirements tending up slightly. Heavier gages are needed for most fabricated work. Some stamping shops ordinarily engaged mainly on steel, are fabricating more aluminum sheets under subcontracts for aircraft; this is notably true of a large shop in the Worcester district.

Production for narrow cold-rolled strip for third quarter are filled and in a few instances mills have only limited capacity open for the fourth. October rolling schedules are filling fast. Buyers frequently find suppliers booked full for the month deliveries are wanted and this results in some shopping to place tonnage. Heat-treating is a bottleneck, with output endangered by labor shortages in some districts.

Sheet mill products are expected to maintain present balance through third quarter, with some possibility that better tonnages will be available during fourth quarter. Increased tonnage moving into tin plate has restricted the available supply of cold-rolled sheets and easing of tin plate during fourth quarter will probably release considerable volume of cold mill tonnage for other purposes. If construction in synthetic rubber and gasoline programs is substantially ended by the close of this year, a large source of plate demand will be eliminated. Any easing in the plate situation will be reflected immediately in sheets because it will release a heavy tonnage of slabs for sheets. The cutback in the aircraft landing mat program has removed a small volume of demand from the market, but pressure continues for drum stock and other miscellaneous sheet uses.

Bars . . .

Bar Prices, Page 136

While peak of war construction has been passed, a number of important units are still to be equipped and placed in operation. Peak of machine tool demand also has been passed but backlogs of machinery builders are heavy and result in heavy demand for bars, which also are moving in large volume to airplane and marine engine builders and to forgers who are under heavy pressure from shipbuilders and manufacturers of marine appliances.

Little bar tonnage is available for third quarter, even in small rounds, most gaps in these specifications having filled rapidly. WPB is expected to provide at least another 1,000,000 tons of bars for an important purpose. While some of this will come from increased capacity it is believed a substantial portion will be eked out from claimant agencies whose needs are considered less pressing.

Consumption of alloy and carbon bars is holding high in New England and in the case of forging shops buying is heavier, notably by those supplying the aircraft industry. While deliveries are tightening as capacity quotas are filled, schedules are out of balance and most mills are limited by the amount of semi-finished available. This is revealed by one producer offering 2000 tons, small sizes of hot carbon bars, for late July delivery from one mill while other units of the same company are booked into September and beyond on larger sizes. Some users in the aircraft field, notably engine builders, slow to change to NE steels, finally are taking this grade in heavier volume. Operation of increased capacity finds one producer able to do slightly better on electric furnace than open-hearth steels but this is an exception. Some alloy melting schedules for June have been supplemented.

Despite an easing in some lines, sufficient volume appears in others at least to sustain bar demand in the New York district. If anything, a larger quantity of bars is moving into aircraft engine plants and shipbuilders and maritime ac-

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Manufacturers of All Kinds of Heat Exchangers for over a Quarter Century
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cessory manufacturers are taking an increasing amount. Some let-up in machine tool requirements is reported, although consumption remains heavy. The general delivery situation appears tighter, notwithstanding some gaps which appear from time to time as a result of readjustments in the war program. New York sellers report little tonnage available before late September, and an increasing backlog for rolling in fourth quarter and beyond. Pressure is still heavy for large rounds and flats.

Tin Plate . . .

Tin Plate Prices, Page 137

As had been expected, tin plate production schedules for third quarter are being continually revised upwards. Normally the heaviest producing period, third quarter produces plate for the heaviest of the vegetable pack and current estimates indicate approximately 725,000 tons of tin plate will be made during third quarter of this year. Thus far there is little indication of fourth quarter tonnage, but in all probability it will drop to about 500,000 tons. Third quarter operations will probably average about 65 per cent and fourth quarter between 40 and 50 per cent.

Several producers have now filed a new price for medium coated electrolytic tin plate. This carries a tin covering of 0.75 pound of tin per base box, as against the normal electrolytic plate which carries 0.50-pound coverage and normal dipped plate which runs 1.25 to 1.50 pounds per base box. The price on the new middle weight product will be $4.65 per base box, as against $4.50 per base box for the regular electrolytic and $5 for dipped plate.

In all probability the new product, which is to be ostensibly on an experimental basis, will be used for certain food packs which have not yet been switched over to the electrolytic product.

Wire . . .

Wire Prices, Page 137

Wire mill capacity for third quarter is filled for many products, but schedules are somewhat out of balance as the period approaches. On most active specialties, high carbon rounds and music wire, mills are well filled, but on bright basic and a few other items deliveries can be promised in July. Wire required for war continues heavy, but pressure has subsided in some directions, due in part to somewhat better scheduling under CMP and slight easing for tonnage in others. The overall demand holds up for the most part. Orders for aircraft extend into second quarter next year. With the possible exception of gun and other mechanical springs, as with aircraft, some producers are reducing delivery pressure with indications some relaxation in the use of wire in small lots for a few civilian needs may be forthcoming, bobby pin wire, for instance. Sidewalk salesmen are hawking bobby pins in New York, a dozen for a dime. With this is some easing in rods; consumer inventories are heavier and better balanced in more cases. Bullet core steel, barrage cable and camouflage material, while active, has slackened moderately with some mills, although a snapback on the latter two is expected shortly.

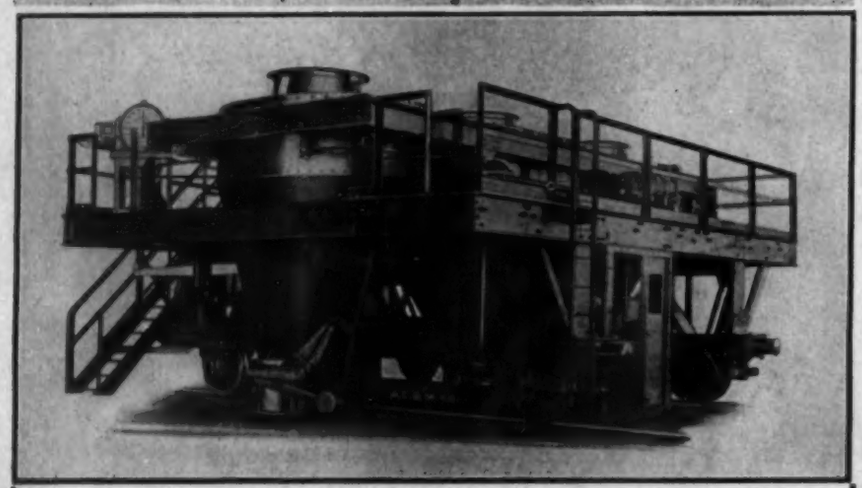
Rope mill requirements are as heavy as ever, yet wire requirements are generally met on schedule. Resumption of lend-lease in heavier volume is developing, which is expected to release much tonnage now in warehouses, including considerable music wire for Russia. During the slack in demand for this grade for export, mills have made progress in covering domestic demand. Orders extending into next year are for long-range programs, including aircraft, also for a wide variety of springs required for ordnance. Close to 90 per cent of orders taken by one eastern specialty mill is for use in some form of spring. High carbon rounds and substantial alloy needs are included and heat-treating capacity is heavily taxed, gearing production of numerous products to the limit of furnaces to process material.

Structural Shapes . . .

Structural Shape Prices, Page 137

Slack demand for fabricated structural steel for construction is only partially offset by substantial requirements for ships. Semifinished allocated rolling is geared to restricted current demand and operations for the industry range around 60 per cent of capacity; some semifinished is going to lend-lease. Fabricating shops are frequently consuming more plates than shapes, reversing normal operations. Most welding capacity is employed, but riveted operations are slow. Shops, in some cases, are operating welding departments 24 hours daily

COKE OVEN EQUIPMENT



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on miscellaneous subcontracts, mainly in connection with shipbuilding. Shapes can be shipped in five to seven weeks.

An eastern shipyard recently placed 40,000 tons of prefabricated work with fabrication in the eastetrn Pennsylvania area.

Scrap . . .

Scrap Prices, Page 140

Lack of manpower in scrap yards is becoming more acute and supply of material in some areas shows the effect of fewer persons engaged in collection. Yards also find it difficult to prepare even the diminished tonnage available. Scrap interests in the St. Louis district have appealed to WPB for relief but the situation has not been bettered. Buffalo yards need 60 or more additional workers and have asked the United States employment service to furnish them.

Regional WLB has fixed tested rates for scrap dealers in the Cleveland, Dayton, Columbus, Cincinnati and Louisville areas. The rates are those above which the War Labor Board will not approve increases except in accordance with the Little Steel formula, and were applied in deciding applications for approval of voluntary wage increases from 25 scrap dealers. Common labor rates are: Louisville, 55 cents; Cincinnati, 60 cents; Columbus, 65 cents; Cleveland and Dayton, 70 cents.

So well covered are most New England foundries on cast grades that some are cancelling scrap contracts. Stove plate is also slack, although some is going to blast furnaces in small sizes. Demand for shipyard scrap exceeds supply and allocations have been made to electric furnaces outside the district.

While some battlefield scrap is being received at eastern seaboard ports from North Africa and more is expected, it is considered possible that much will be retained for use in Italy upon conquest of that country. It is recalled that when Italy was expanding her steel industry in the early 30's she was a substantial buyer of scrap from the United States, having little such material from her own sources.

Cincinnati dealers and melters find flow of industrial scrap unimpeded but other material is below normal. Some estimates place current volume at 25 per cent less than a year ago. Many melters are slow to accumulate reserves. Yards are said to be operating with only 50 per cent of the labor employed in January, 1941.

Iron and steel scrap is dull in the Pittsburgh area with some interest being shown in additional supplies of blast furnace scrap and all consumers taking delivery on heavy melting steel and special grades. About the only interest in the market here has been caused by the coal strike, which is responsible for heavier demand for blast furnace material. The more scrap charged into blast furnaces, the less coke required and scrap consumption went up during the strike, when coke was at a premium.

Movement of scrap continues slow in the Chicago area in spite of favorable weather. Industrial material reflects war goods curtailment in numerous plants, and railroad scrap offerings have lessened as the carriers have been restricted on the amount of new steel they can receive. A somewhat better intake of country scrap, particularly from the recently flooded areas, is insufficient to offset these major shrinkages. Mills are receiving ample material, however, and are adding to inventories. Rejections are not appreciable, but brokers experience difficulty in moving turnings and borings.

Nonferrous Metals . . .

Nonferrous Prices, Page 141

New York — Allocations of copper for July delivery are practically complete. Anxiety among sellers as to obtaining enough metal to meet distribution certificates has been fading in recent months, tight control under CMP have effected a better balance between supply and demand. No scramble to certify allotments for July is noted and some consumers were inclined to lag. Total tonnage to be delivered has shown little variation in recent months.

Distribution details are affected by scrap supply and the position of consumers as to war production schedules. Where scrap is available in good volume, new copper allotments are smaller while some fabricators, well ahead of production schedules, will get less metal next month.

Brass mills holding authorized controlled material orders originally scheduled for April delivery are permitted to fill them until June 30, if production has advanced beyond the point where materials can be diverted to other authorized orders scheduled for May or

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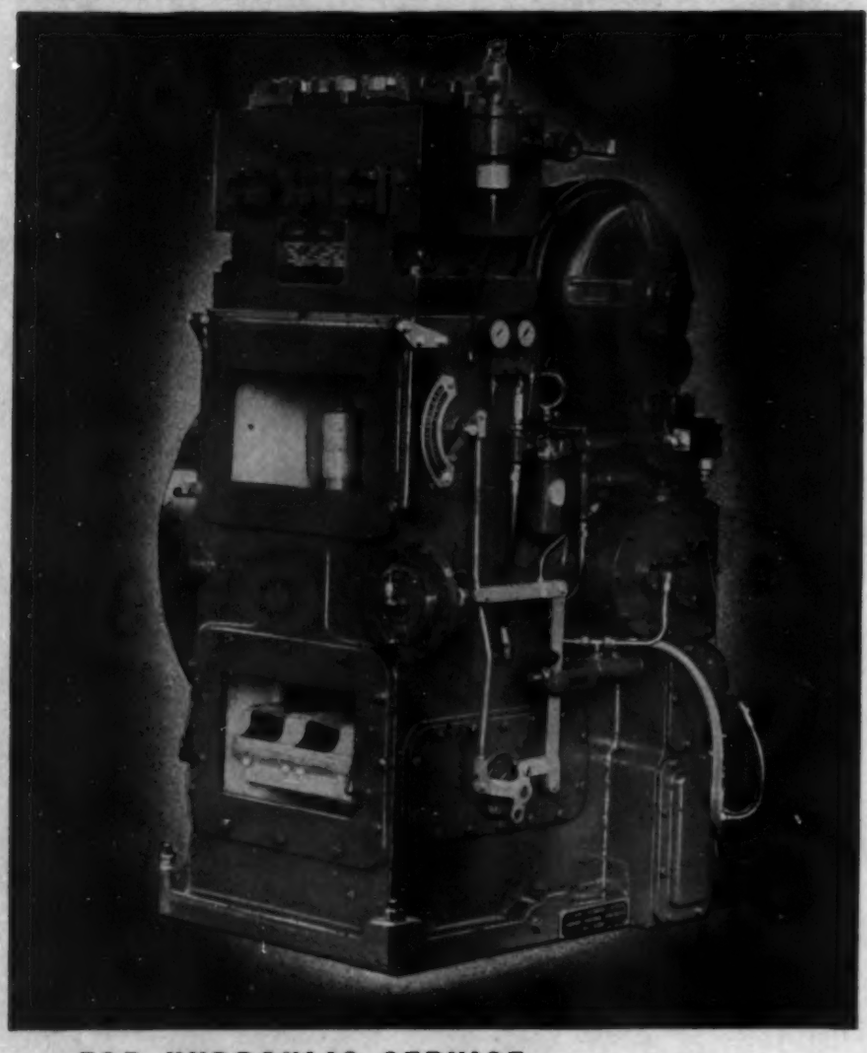

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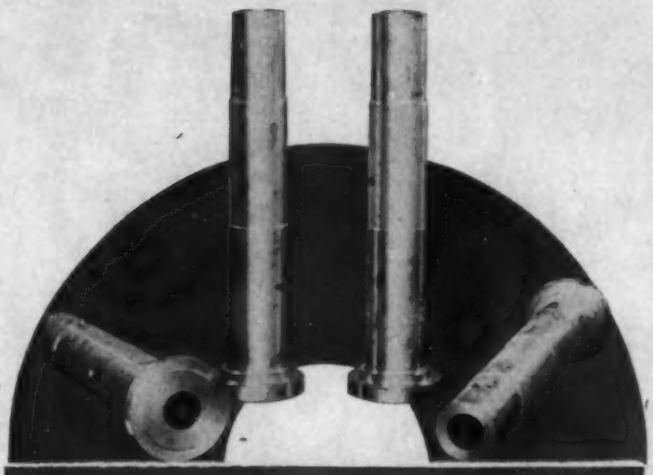

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later. Major cable companies have been directed to ship a definite volume of copper cable to regular warehouses each month to forestall any possible shortage for the mining industry.

As of Aug. 1, WPB will end its present practice of paying prices substantially above the current scrap price level for copper stocks, unusable in their present forms, which have been made idle as a result of WPB conservation orders and which are required for remelting for war use. The government will continue to pay the present higher-than-scrap prices, under the copper recovery program, for certain materials reported to the WPB up to and including July 31 and purchased for remelting. Holders of idle inventories of copper and copper-base alloys which cannot be used in their present forms and which are reported on and after Aug. 1 will be directed to sell such materials at scrap prices.

The new procedure, effective Aug. 1, was adopted because of the virtual completion of the change from a peacetime to a wartime economy and because of the general cleaning out of inventories resulting from that change. Idle materials which can be used in their present forms will continue to be redistributed through direct transactions between owners and purchasers at negotiated prices.

Trial runs are under way at the new aluminum rod and merchant mill at Messina, N. Y., which was designed for the production of I-beams up to 21 inches and 10-inch rods, the first attempt at tonnage for larger sections of these sizes. Production under the expansion program for aluminum is rapidly approaching its peak. Capacity for the production of aluminum rivets is now greater than current demand, but this is probably temporary in view of the sharply expanding aircraft program.

WPB finally is taking action in relieving the pinch in aluminum forgings and extrusions for the aircraft program. The extrusion program especially has been neglected, according to one official, but by July 1 capacity will have been doubled. More extrusions have been worked into aircraft design. Lack of labor on the West Coast has held up operations of brand new aluminum reductions plants. Part of one plant has been idle since April because scouting parties have been unable to find 125 laborers.

A new development in the aluminum industry is the announcement Phelps Dodge Copper Products Corp. will engage in manufacture of aluminum and magnesium tubes, rods and shaped parts by the extrusion process. A new Defense Plant Corp. unit will be built and operated by the Phelps Dodge organization.

Zinc allocations are appearing late for small lots each month and are filled without difficulty.

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. . . . and a pretty important factor at that—considering that MEXALOY's contribution enters the picture near the close of the ceremony and at a time when every precaution has been exercised toward the building of a good heat . . . . And here's how this especially prepared Graphite product guards your steel's quality:

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THE UNITED STATES GRAPHITE CO.
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Fog Bedevils Lake Iron Ore Shipments

(*Continued from Page* 82)

date this year; including the collision of the IRVING S. OLDS, Pittsburgh Steamship Co.'s vessel and the C. O. JENKINS of the Midland Steamship Co.'s line. The Canadian ore vessel PRENDOC was lost earlier this year in Lake Superior.

The IRVING S. OLDS, back in service after its recent collision, had aboard a new record cargo last week of 17,817 gross tons. Three others of the Pittsburgh Steamship Co.'s newest vessels were in transit with cargoes of more than 17,000 tons each.

Iron ore shippers are confident that the 91,000,000 tons shipment goal will be reached this year despite the many handicaps to be overcome. Besides the unfavorable weather conditions shippers point out that only 5 of the 16 ore vessels being built for the United States Maritime Commission have been placed in service. Eight are expected to be in the ore trade by Aug. 1 and the remainder before Oct. 1. Original schedule called for eight at opening of the shipping season. In addition, 27 ore-type vessels still are in the grain trade, against none at this time last year.

There were 310 Great Lakes ore vessels in commission June 15 last and 292 in the ore trade, according to the monthly report of C. C. Lindeman, statistician for M. A. Hanna Co., Cleveland. This compares with 279 in the ore movement May 15 and 297 on June 15, 1942. Fleet trip capacity for the month ended June 15 was 2,865,090 gross tons compared

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the performance and life of most U.S. Aircraft engines—not only travel in the tool boxes but are used to control the torques applied in their manufacture. They are used to assure the uniform "set" of vital screws, to prevent uneven strains and warping, to gauge the set of spark plugs, to measure frictional drag, etc. Sizes to accurately measure torque from 0 to 7200 in. lbs., they eliminate guess work and haphazard tightening. They are introducing new accuracy in the manufacture of even the most delicate instruments . . . also come in sizes for the heaviest work. Products of STURTEVANT, pioneer manufacturers of accurate torque wrenches, they have the flat beam which eliminates all springs, adjustments and fragile mechanisms or moving parts. They are permanently accurate.

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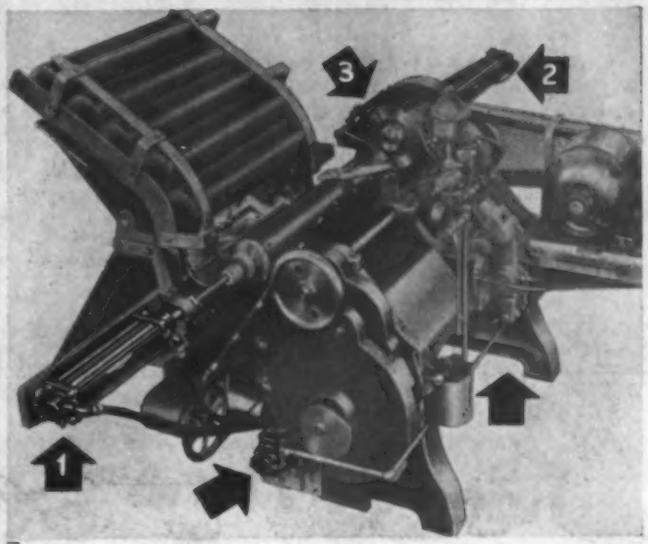

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V & O Cartridge Case Trimming Machines — built by The V & O Press Co., Hudson, N. Y. — are a fine example of the application of air power to precision machine movements. Three Model "A" Air Cylinders are used on each machine: — One for gauging and trimming, the second for ejecting the trimmed cases, and the third for stripping scrap metal from the trimming chuck.

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with 2,841,090 for the month ended May 15, and 2,725,140 June 15, 1942.

Propose Deepening Of Buffalo Harbor

Elimination of rock ledges in the Buffalo harbor to permit heavier loading of ore vessels unloading at that port has been proposed by the Buffalo Chamber of Commerce. The chamber has asked the Office of Defense Transportation to approve the project as essential to the war program.

At present, according to chamber officials, from 1200 to 1500 tons of ore are lightered off ore carriers at Detroit on the way to Buffalo. Not only is time lost during the lightering operation, but cargo space is lost on the run between Detroit and Buffalo.

Canada . . .

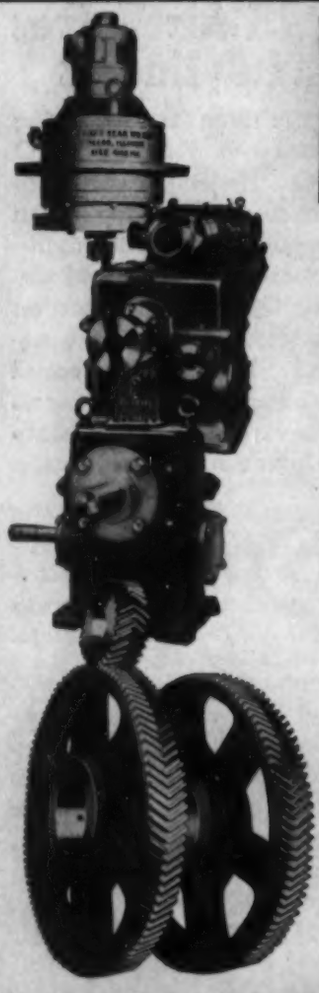
Toronto, Ont.—Demand is well sustained, with indications that future buying will show accelerated tempo in heavier steel materials. Announcements by C. D. Howe, minister of munitions and supply, to the effect that there will be a number of changes in Canada's war production program, with no loss in overall output, is interpreted by steel producing interests to mean that steel consumption, in such materials as heavy ship plate, armor plate, alloy steel and bars, as well as small structural shapes for shipbuilding, will be given preference on production lines and tonnages involved will exceed those of earlier war years. Just how extensive the demand for steel will be under the new war program is a matter of conjecture but one thing definite is that order placing for various lines of steel is gaining momentum and mills have larger tonnages on their books for delivery up to the end of the year. To some extent restrictions have been lifted on forward delivery buying and mills now are taking practically all offerings on an if and when delivery basis.

Scrap iron and steel receipts are increasing as the result of better deliveries from the rural districts and mining fields, but have not yet reached full stride from Northern Ontario and Quebec. It is estimated that salvage drives so far this year have produced about 10,000 tons of steel and iron scrap, with collections limited in the farm areas. War plants are maintaining a steady flow of turnings, borings and other light scrap, and a large part of this material is going direct to mills and electric furnaces. Dealers are maintaining steady shipments to consumers, and some have speeded up deliveries in the past week or ten days.

Steel in Europe . . .

London—(*By Radio*)—Output of billets and bars is increasing in Great Britain to meet war requirements. Plate demand is rising as shipbuilding activity is more intense. Railroads and collieries are buying more steel for maintenance and extensions.

Brad Foote



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STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

900 tons, shop building and warehouse, Northern ordnance plant, Fridley, Minn., operated by Northern Pump Co., to Minneapolis-Moline Power Implement Co., Minneapolis.

828 tons, propeller plant, A. O. Smith Corp., Milwaukee, to Wisconsin Bridge & Iron Co., Milwaukee.

600 tons, tube reducing shop, Wallington, N. J., to Bethlehem Fabricators, Inc., Bethlehem, Pa.

135 tons, chutes, hoppers, spouts, stacks, etc., new electric furnace steel plant, Republic Steel Corp., Chicago, to Mississippi Valley Structural Steel Co., Decatur, Ill.; James Stewart Corp., Chicago, contractor.

SHAPE CONTRACTS PENDING

6380 tons, Colorado river bridge, Topac, Ariz., for Atchison, Topeka & Santa Fe railroad; bids June 8.

230 tons, dye shop addition for E. I. du Pont de Nemours & Co., Carney's Point, N. J.

REINFORCING BARS . . .

REINFORCING STEEL PLACED

600 tons, modification center, airplane plant, Denver, for U. S. Army air corps, to Truscon Steel Co., Youngstown, O.

300 tons, air field, Ottumwa, Iowa, to Laclede Steel Co., St. Louis.

150 tons, expansion, A. E. Staley Mfg. Co., Decatur, to Joseph T. Ryerson & Son Inc., Chicago, J. L. Simmons Co., Decatur, Ill., contractor.

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KEEP BOLTED ASSEMBLIES
permanently TIGHT
BEALL Spring Washers compensate for wear, bolt-stretch, corrosion and break-down of finish. They meet rigid Army, Navy and Air Corps specifications. Available in Carbon Steel, Stainless Steel, Phosphor Bronze, Everdur and Monel Metal. Finished in Cadmium Plate, Galvanized, Silver and Parkerized. IMMEDIATE SHIPMENT of all standard sizes.
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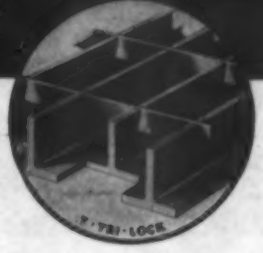

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RAILS, CARS . . .

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Indianapolis Union, three 0-8-0 type switch engines, to Baldwin Locomotive Works, Eddystone, Pa.

Chicago, Rock Island & Pacific, ten 4-8-4 type locomotives, to American Locomotive Co., New York, subject to WPB approval.

LOCOMOTIVES PENDING

Chesapeake & Ohio, forty 2-8-4 type locomotives; bids asked.

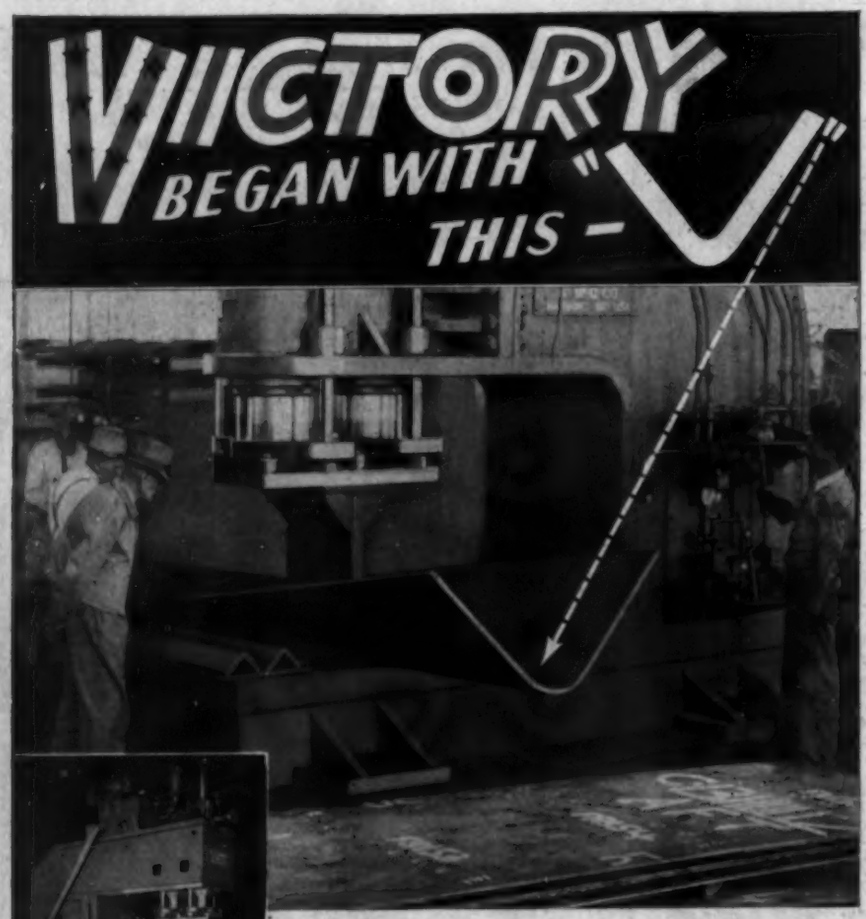
CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—B. F. Goodrich Co., 500 South Main street, has been given $900,000 contract by Defense Plant Corp. for machinery and equipment in an Ohio plant.

CLEVELAND—Tool Die Engineering Co. has been incorporated by Leo G. Bayer, 210 National City Bank building, statutory agent, Stanton Addams and Elizabeth S. Butler.

CLEVELAND—Meters & Pumps Inc., Charles J. Bellar, president, 10700 Broadway, will build a one-story plant addition, to cost about $4000.



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CLEVELAND—Browning Crane & Shovel Co., Sheldon Cary, president, 16226 Waterloo road, is having plans made for four additional plant buildings.

CLEVELAND—Marquette Metal Products Co., 1145 Galewood drive, Herbert Gleitz, president, is planning addition 29 x 120 feet for locker building.

CLEVELAND—Rex Tool Corp. has been incorporated by O. W. Norman Wangen, John T. Dolezal and S. F. Korenz, to manufacture tools, dies, jigs, gages and special machinery. William C. Etzel, 816 Hippodrome building, is statutory agent.

CLEVELAND—Industrial Rayon Corp., Hiram S. Rivitz, president, West Ninety-eighth street and Walford avenue, has authorized substantial capital expenditures for expansion of manufacturing facilities in northern Ohio under War Production Board auspices.

CLEVELAND—Philburt Mfg. Co., 9312 Cassius avenue, has been incorporated to manufacture machine tool products. Production will start as soon as remodeling has been finished at above address formerly occupied by Reel Tool & Mfg. Co. Incorporators are Philip Purer, Bert F. Jacobson and Lewis I. Gottlob.

CLEVELAND—Zane Mining Co. has been incorporated by F. I. Walter, C. F. Taplin and associates to mine coal and manufacture by-products in connection. Earl E. Platell, secretary of the Harris Coal Corp., 900 Midland building, is statutory agent.

ELYRIA, O.—Duplex Mfg. & Foundry Co., 398 West River street, has been given building permit for a two-story plant building at West River street and New York Central tracks, to contain core room, ovens and storage, costing about $6000.

ELYRIA, O.—Gilkinson Mfg. Co., G. C. Gilkinson, president, plans replacement of burned war plant at Abbey road near New York Central tracks. Plant consisted of one-story building 150 x 200 feet with three wings, 26 x 50, 45 x 70 and 26 x 70 feet.

CONNECTICUT

NEW HAVEN, CONN.—New Haven Malleable Iron Co., C. M. Brenan, president, 385 Clinton avenue, will let contract soon for a one-story 70 x 250-foot foundry addition, 40 x 70-foot annealing plant, on Clinton avenue, to cost over $40,000.

NEW JERSEY

BLOOMFIELD, N. J.—General Electric Co., 5 Lawrence street, has let contract for one-story boiler house and coal silo to Becker Construction Co., 361 Grove street, Newark, N. J., to cost about $40,000. E. Gorham, 5 Lawrence street, is architect.

JERSEY CITY, N. J.—Air Reduction Sales Corp., 60 East Forty-second street, New York, has let contract to James Mitchell, 575 West Side avenue, for engine room building and cylinder storage building, to cost about $40,000.

NEWARK, N. J.—Western Electric Co., 100 Central avenue, Kearny, N. J., has let contract to Hugh Montague & Sons Inc., 880 Bergen avenue, Jersey City, N. J., for repairs and alterations to manufacturing building, costing about $40,000.

PATERSON, N. J.—United States engineer, 120 Wall street, New York, has let contract to Mahieu Construction Co. Inc., 38 Wagaraw boulevard, Paterson, for a sewage disposal plant in Passaic county.

PERTH AMBOY, N. J.—Perth Amboy Dry Dock Co., foot of Broad street, has let contract to Wallace Wilck, 280 Hobart street, for a boiler shop costing $47,000.

PERTH AMBOY, N. J.—American Smelting & Refining Co., 1160 State street, has let contract to Wallace Wilck, 280 Hobart street, for a one-story research building, to cost about $40,000.

WALLINGTON, N. J.—Tube Reducing Corp., 52 Main avenue, has let contract to Mahony-Troast Corp., 657 Main avenue, Passaic, N. J., for a one and two-story steel frame manufacturing building 167 x 440 feet.

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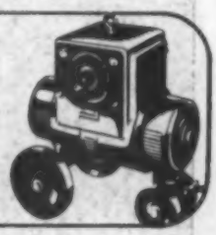

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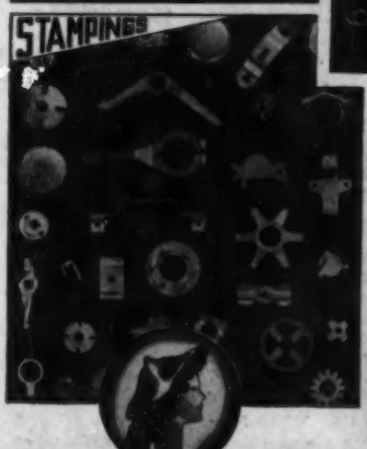

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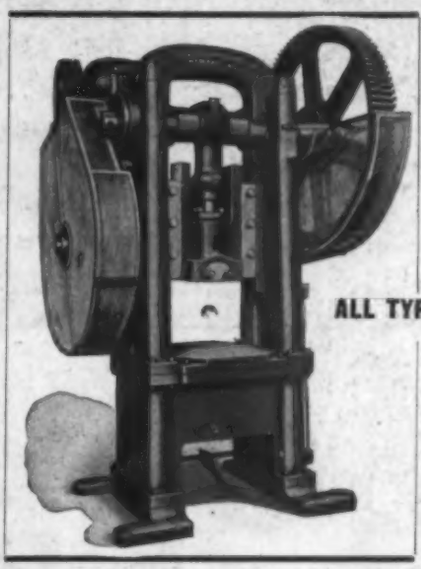

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E. E. Seelye, 101 Park avenue, New York, is engineer.

ILLINOIS

CHICAGO—Ahlberg Bearing Co., 3025 West Forty-second street, has received additional DPC contracts of about $1,000,000 for facilities expansion, limited to equipment.

CHICAGO—A. B. Equipment Mfg. Co., 223 West Erie street, has bought plant of Nichols Engineering Co., 2139 West Erie street, using 28,000 square feet and leasing remainder to former owner.

CHICAGO—Craft Mfg. Co., 1512 North Fremont street, stainless steel products, has bought from Mandel Stores Co. a one-story garage at Pulaski road and Schubert street and will convert it into a manufacturing plant.

CHICAGO—Electronic Mechanics Inc., Clifton, N. J., has established a manufacturing branch in Chicago and has bought a one-story building containing 17,000 square feet of floor space, at 1917 North Springfield avenue. Additional 35,000 square feet is available for expansion.

HARVEL, ILL.—Wyman-Gordon Co., manufacturer of internal combustion engine crankshaft forgings, has received DPC authorization for additional plant facilities.

MOLINE, ILL.—Deere & Co., manufacturer of agricultural implements, has received an additional commitment of $500,000 from Defense Plant Corp. for additional facilities.

ROCKFORD, ILL.—Rockford Die & Tool Works Inc. plans construction of a one-story addition to its machine shop. Gilbert A. Johnson, Swedish-American Bank building, is architect.

ROCKFORD, ILL.—Rockford Screw Products Co. will award contract soon for a one-story factory addition 120 x 120 feet and 24 x 60 feet. Gilbert A. Johnson, Swedish-American Bank building, is architect.

SOUTH BELOIT, ILL.—Warner Electric Brake Mfg. Co., Beloit, Wis., has let contract to Cunningham, Bros., Beloit, for a one-story factory addition to its plant at South Beloit, 78 x 240 feet. W. Fred Dolke, 189 Madison street, Chicago, is engineer.

GEORGIA

ATLANTA, GA.—A. K. Adams Co., 542 Plum street, N. W., has been given contract for alterations and additions to Fisher Body Co. plant on McDonough boulevard, Atlanta, for Firestone Tire & Rubber Co., Akron, O., and Defense Plant Corp., Washington. Cost will be over $100,000.

MISSOURI

ST. LOUIS—John Ramming Machine Co., 4591 McRee street, has let contract to Fred Koenig, 3918 Bowen street, for a brick and reinforced concrete addition to machine shop.

OKLAHOMA

BARTLESVILLE, OKLA.—Cities Service Gas Co. plans natural gas line, 240 miles of 26-inch pipe, from Guymon to Blackwell, including booster stations and pumping plants, to cost about $2,400,000.

OKLAHOMA CITY, OKLA.—United States engineer office, 416 Wright building, Tulsa, Okla., has let contract to Charles M. Dunning Construction Co., 420½ North Hudson, Oklahoma City, for construction of buildings at the modification center.

TULSA, OKLA.—United States engineers, 416 Wright building, Tulsa, has let contract to Corbetta Construction Co. Inc., New York, for construction of buildings at the modification center.

TULSA, OKLA.—Stanolind Pipeline Co., Philcade building, Tulsa, has received War Production Board approval for 383-mile crude oil pipeline from Sundown, Tex., to Drumright, Okla., with capacity of 54,000 barrels per day, to cost about $7,000,000 and requiring approximately 44,600 tons of steel.

WISCONSIN

BELOIT, WIS.—Fairbanks-Morse & Co., has let contract to Cunningham Bros., 359 East Grand avenue, for an electric coil processing building, one story, 40 x 80 feet, and receiving building, one story, 72 x 80 feet. W. Fred Dolke, 189 West Madison street, Chicago, is architect.

KENOSHA, WIS.—Snap-On-Tools Corp., manufacturer of tools, wrenches and similar products, has let contract to Austin Co., 510 North Dearborn street, Chicago, for a one-story building 40 x 130 feet.

MILWAUKEE—Inter-State Tool & Mfg. Co. has been incorporated to manufacture tools, by Charles W. Stephen and associates.

MILWAUKEE—Harnischfeger Corp., manufacturer of cranes, hoists, power shovels and similar products, has let contract to Endlich Construction Co., 1827 North Thirtieth street, for a one-story die casting building.

OSHKOSH, WIS.—Wisconsin Axle Division, Timken-Detroit Axle Co., manufacturer of truck axles, has let contract to Ben B. Ganther Co. for a one-story plant addition 82 x 100 feet.

RACINE, WIS.—John Oster Mfg. Co., manufacturer of hair clippers, massage machines and similar products, has let contract to Carl Korndoerfer for a one-story factory addition.

SHEBOYGAN, WIS.—Potts Foundry Co. plans a one-story addition to foundry on South Seventeenth street.

WAUSAU, WIS.—Marathon Battery Co. is having plans made for a plant addition on Henrietta street.

WAUSAU, WIS.—Wausau Motor Parts Co., manufacturer of piston rings and other auto-

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motive accessories, has let contract to Paul Wergin for a one-story factory addition 40 x 200 feet.

MINNESOTA

MANKATO, MINN.—Kato Engineering Co., C. H. Jones, president, manufacturer of lighting plants, electric converters, generators, etc., will rebuild burned plant, one story, 66 x 150 feet.

MINNEAPOLIS—McQuay Inc., manufacturer of radiators, etc., has let contract to J. W. Crawford Co. for plant improvements and one-story gas generator plant.

ST. PAUL, MINN.—Walter Erickson Machine Co., 72 Fillmore avenue West, has been incorporated to conduct a general machine shop and to manufacture tools and machinery, by Walter F. Erickson and associates.

TEXAS

BEAUMONT, TEX.—Southern Acid & Sulphur Co., Beaumont, has let contract to Tellepsen Construction Co., 3900 Clay avenue, Houston, Tex., for chemical plant and equipment, costing about $200,000.

DALLAS, TEX.—National Geophysical Co., 8806 Lemmon avenue, has let contract to Cowdin Bros., 411 South Haskell street, for a factory building costing about $50,000. Walter W. Ahlschlager, 212 South St. Paul street, is architect.

SOUTH DAKOTA

PIERRE, S. DAK.—City plans improvements to municipal light and power plant, including purchases of generating equipment when such equipment is made available, to cost about $120,000. N. W. May is city auditor.

WATERTOWN, S. DAK.—City plans improvements to municipal light and power plant and installation of coal-handling and other equipment, to cost about $75,000, when authority is obtained to purchase equipment. F. J. Hubbard is city auditor.

MONTANA

MILES CITY, MONT.—Elmer T. Brink, director of the Tongue & Yellowstone Beet Growers' Association, plans construction of a beet sugar factory.

POLSON, MONT.—Flathead Pulp & Paper Co. is having plans made for a plywood manufacturing plant.

CALIFORNIA

ALHAMBRA, CALIF.—Kay Brunner Steel Products Co., 999 Meridian avenue, is building an additional storage building costing about $10,000.

DEL MAR, CALIF.—Del Mar Turf Club will convert its buildings into a factory for manufacture of airplane parts. Fred Poggi is manager and L. J. Turner chief engineer and superintendent.

SACRAMENTO, CALIF.—United States engineer, 1208 Eighth street, has received low bid from Central California Construction Co. Inc., 230 California street, San Francisco, for a sewage disposal plant at Fresno, Calif., under $100,000.

VENICE, CALIF.—Airesearch Mfg. Co., 9851 Sepulveda boulevard, has let contract for a plant 82 x 302 feet, to cost about $50,000.

OREGON

ROSEBURG, OREG.—Western Battery Separator Co., San Francisco, with factory at Marshfield, Oreg., plans construction of another large plant at Roseburg.

CANADA

BURNS TOWNSHIP, ONT.—Barry's Bay Lumber Co. Ltd. is considering plans for construction of sawmill here, to cost, with equipment, about $30,000.

HAMILTON, ONT.—A. H. Tallman Bronze Co. Ltd., Cavell avenue, has had plans prepared and will start work soon on construction of plant addition to cost about $10,000.

HAMILTON, ONT.—Kennametal Tool & Mfg. Co., 24 Dunbar street, has given general contract to W. H. Cooper Construction Co. Ltd., 306 Medical Arts building, for construction of plant building, one story, 50 x 150 feet, estimated to cost, with equipment, about $50,000.

LONDON, ONT.—Sparton of Canada Ltd., 100 Elm street, G. A. Holmes, secretary, radios, electrical goods, has given general contract to W. C. Northey, 371 Wortley road, for construction of plant addition, estimated to cost about $15,000.

TRENTON, ONT.—Central Bridge Co. Ltd., 300 West street, has had plans prepared for construction of plant addition, to cost, with equipment, about $15,000.

WINDSOR, ONT.—Dominion Forge & Stamping Co. Ltd., Seminole Road, has given general contract to Allan Construction Co. Ltd., 44 Wyandotte street East, for construction of plant addition, to cost, with equipment, about $35,000.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd., Sandwich street East, has had plans prepared for further plant addition here, to cost about $25,000.

MONTREAL, QUE.—Cote Brothers & Burritt, 1260 Conde street, elevators, hoists, etc., are having plans prepared for construction of plant building 44 x 87 feet, to cost, with equipment, about $25,000.

MONTREAL, QUE.—General Steel Wares Ltd., 2355 Delisle street, has had plans prepared by Edward J. Turcotte, architect, 1010 St. Catharine street West, and will start work at once on construction of plant addition, 60 x 63 feet, to cost, with equipment, about $25,000.

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SHEARS, Plate 44" & 54" x 3/16" M.D.
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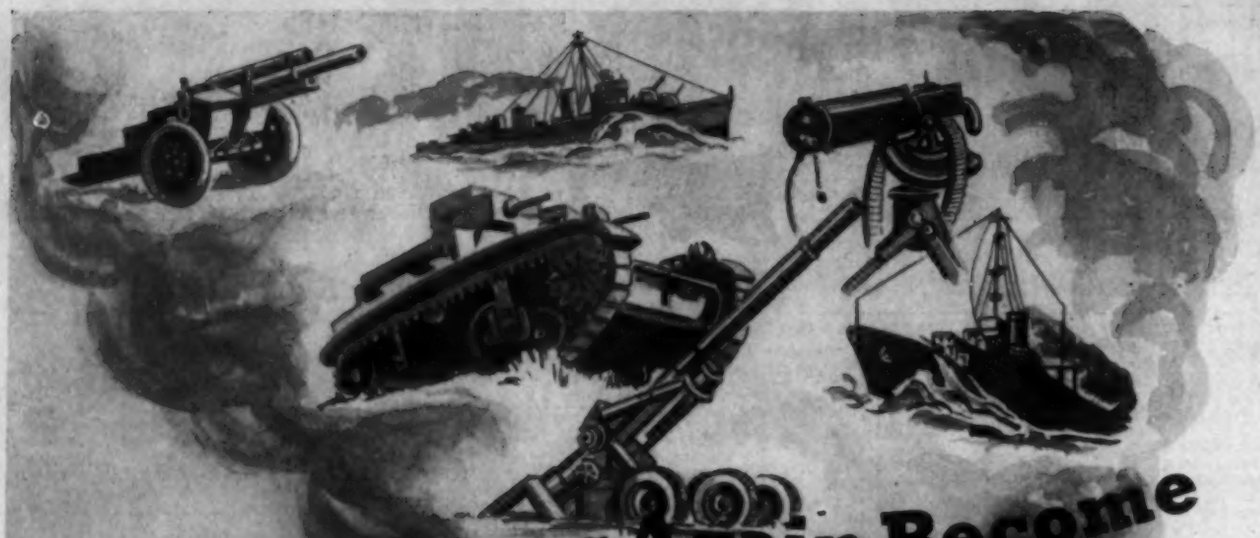

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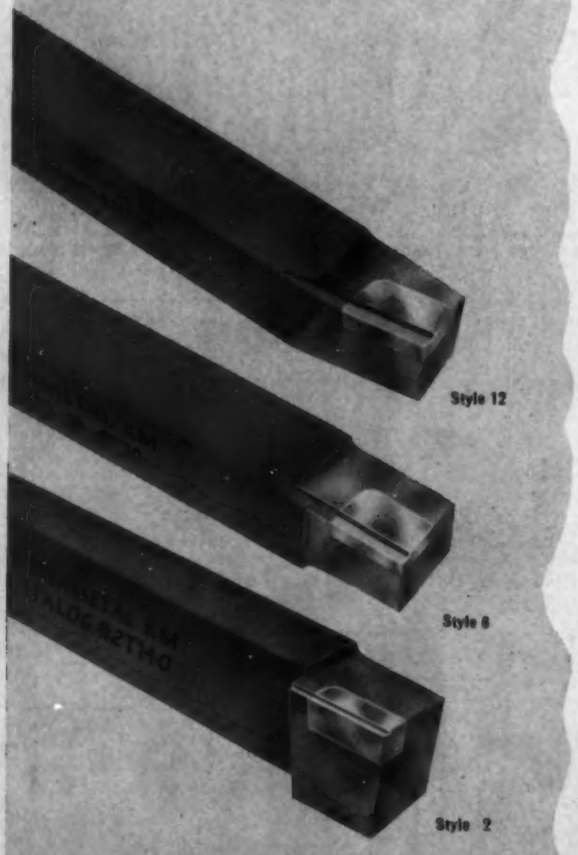

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KEEP HIM ON THE FLOOR AND *Send the Lubricant!*

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Yet *he* can't work with the equipment running and *you* can't afford any down time—either to lubricate by hand, or what is worse, to replace burned-out bearings.

There's no need to send a man up—no need even to slow down, let alone stop machines. And there's not the slightest need for you to take a chance on dry bearings. Install Farval and *send the lubricant instead!*

The Farval Centralized System delivers lubricant under pressure from a convenient central station to every bearing on the machine, no matter where located. Each bearing receives the correct amount through the Dualine Measuring Valve and—not a one is missed.

Save men—save bearings—*install Farval!*

The Farval Corporation, 3270 East 80th Street, Cleveland, Ohio.

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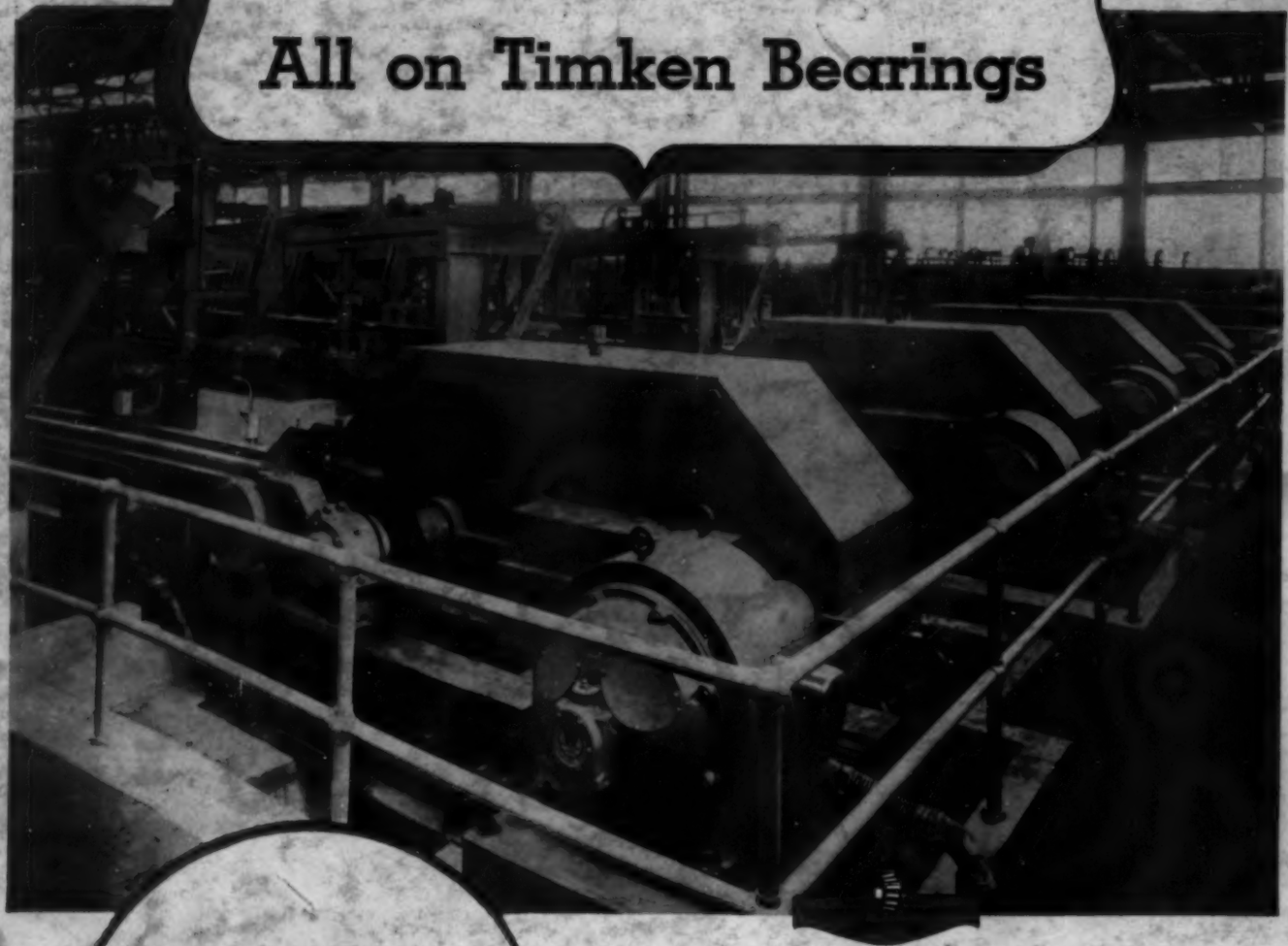

Each of the four draw benches shown in the photograph is of 50,000 pounds capacity. These machines are not the largest built by Aetna Standard Engineering Company; as a matter of fact, there are others in operation ranging in size from 10,000 pounds capacity to 300,000 pounds capacity. In many cases Timken Tapered Roller Bearings are used in the drives, sheaves and carriage wheels.

Wherever steel is manufactured in America, Timken Bearings are helping to produce it faster, better and more economically by eliminating friction and increasing endurance in all kinds of steel mill equipment, and the more Timken Bearings there are in any machine the greater these advantages become. It will pay you to have them at every possible position in the machines you make or buy. The Timken Roller Bearing Company, Canton, Ohio.

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